The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

CLINTON S. DARLING, Editor
CHARLES A. BRESKIN, Adv. Mgr.
E. M. GIBSON, Asst. Mgr.
N. C. ROCKWOOD, Advisory Editor
H. E. HOPKINS, Associate Editor
C. H. FULLER, New York Rep.
GEO. P. MILLER, Manager

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TO SUBSCRIBERS—Date on wrappers indicate issue with which your subscription expires. In writing to have address changed, give old as well as new address

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MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 June 17, 1922 Number 12

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The New Rockland Lime Plant **35, 36, 37, 38, 39, 40, 41, 42, 43, 44**
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One of the problems of the editor is to provide in each issue material which will interest every reader. Not that all material must interest every reader; that would be impossible. But in each issue should be something, a plant description, a news item, an idea to be applied in the plant, to add to the fund of valuable information which every reader is constantly acquiring. This problem is the one referred to as maintaining an editorial balance, and it is an important one from the reader's point of view.

*

Maintaining Balance

Sometimes it is desirable to emphasize specially some feature or some branch of the industry within a particular issue of the magazine. This results perhaps in a slight loss of balance within the issue, but if one point is emphasized strongly at one time a careful editor will emphasize others at other times, and during the course of a year the proper balance is maintained.

This particular issue is specially strong in its material on the subject of lime. This is natural since it follows by only a few days the annual convention of the National Lime Association. Everyone concerned with the production of lime will want a copy of this issue, and will want to preserve it carefully. To be assured of receiving this issue alone is worth to the lime man many times the cost of a year's subscription.

For men in the other rock products industries, the occasional issues where an extraordinary amount of attention is devoted to their industry are invaluable to them, but the other issues—the average ones—are little less valuable, because any one may contain an idea that will make for him hundreds of dollars.

*

A Special Issue

This special issue, even though it is devoted largely to subjects of interest to lime producers, does not by any means lack editorial balance. Articles and news items are devoted to other subjects besides that of lime, and even the lime articles have an unusual interest for producers in several fields.

For example, the article describing the plant of the American Lime and Stone Company is of special interest to cement and to crushed stone producers. A new furnace is expected to throw a flame entirely through a 175-ft. rotary kiln, and if it succeeds this new furnace may cause great changes in the cement industry.

Then the crushing and screening plant of the company is up-to-date in every sense, and contains new ideas such as the spouting system to the bins which other producers may wish to try out.

So the problem of balance, while it must be kept constantly in mind, is one which can be worked out in many ways; and the result in ROCK PRODUCTS of this working out is, we hope, constantly pleasing to its readers.

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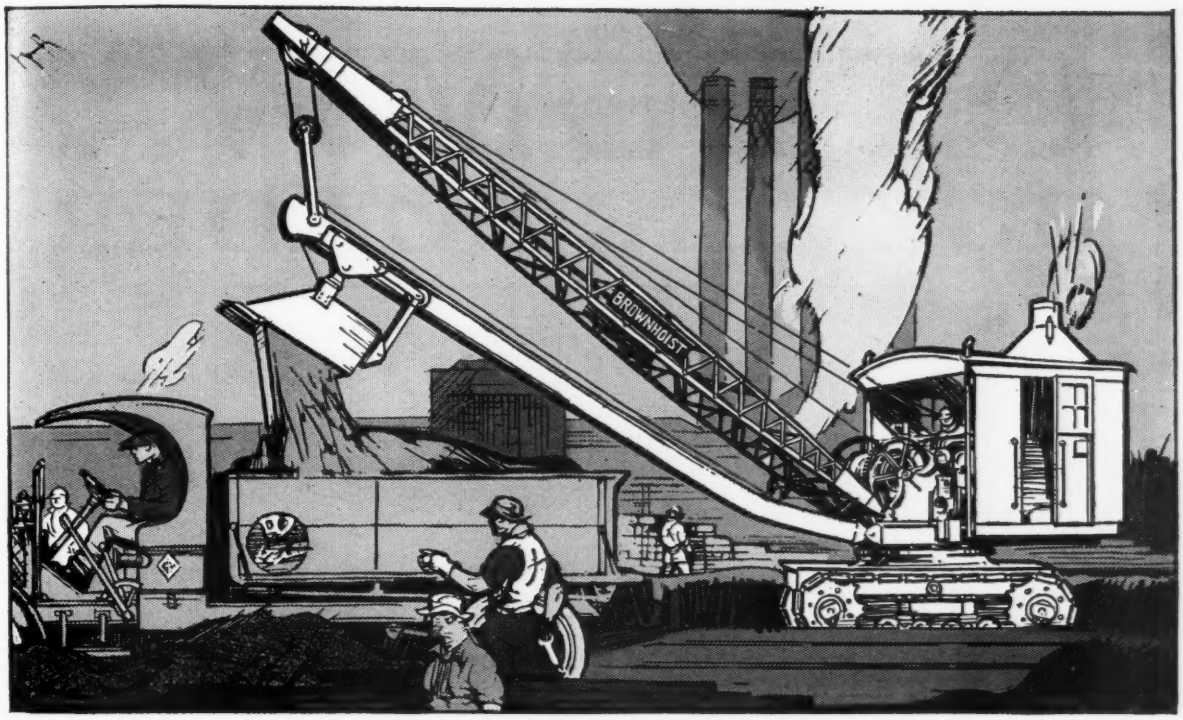

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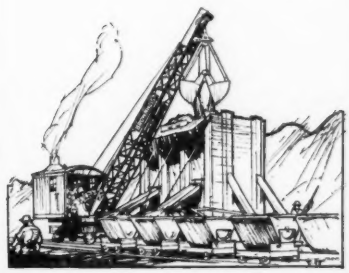

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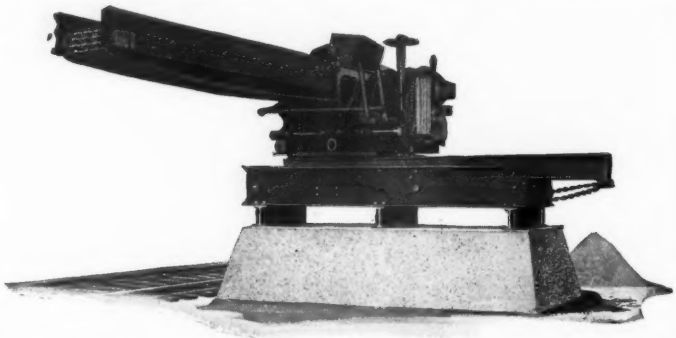

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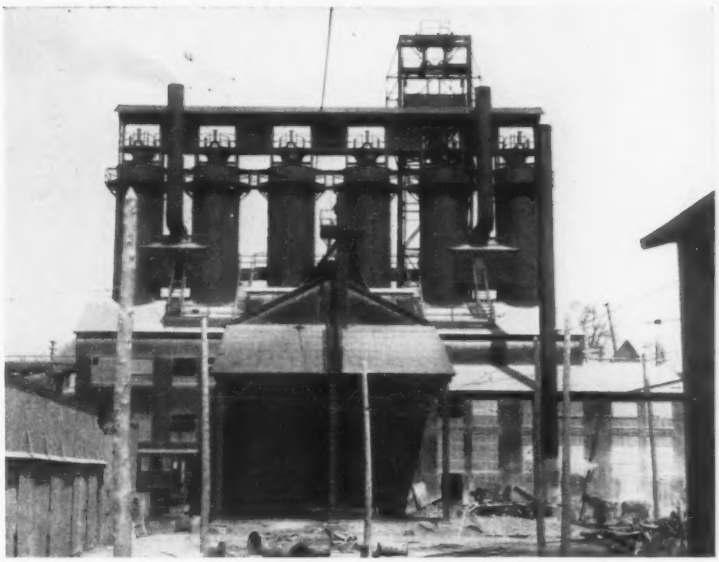

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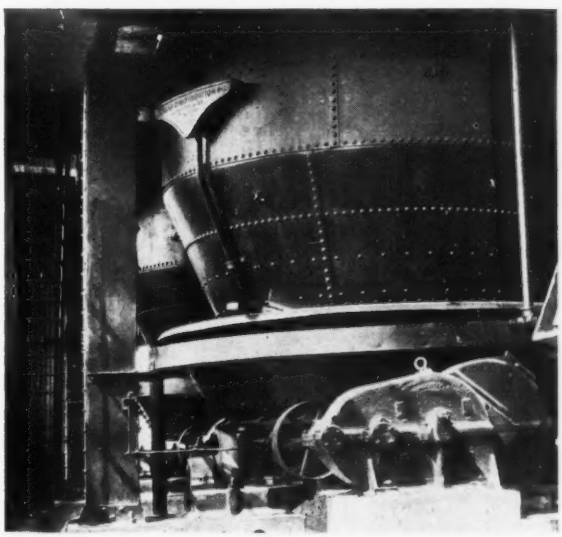

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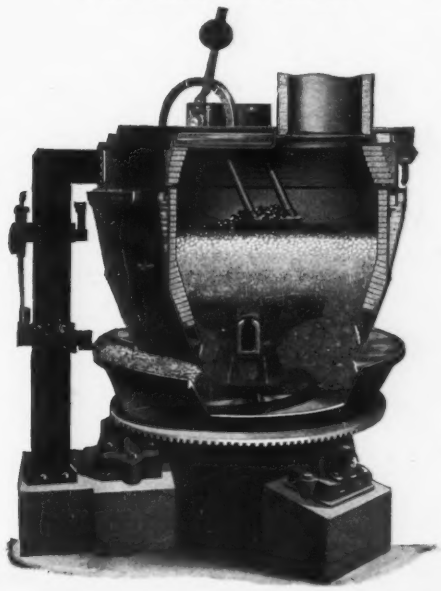

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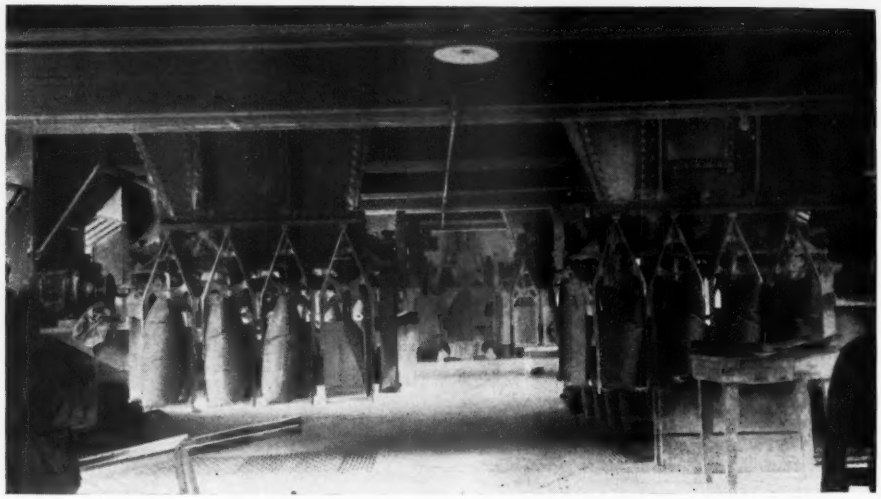

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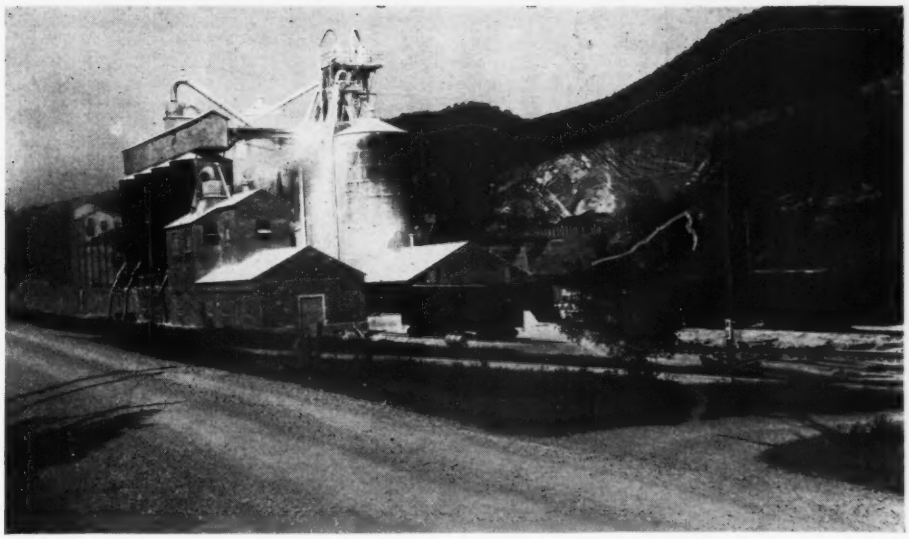

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If YOUR plant is a steady producer of lime or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking — better learn about the Bates System.

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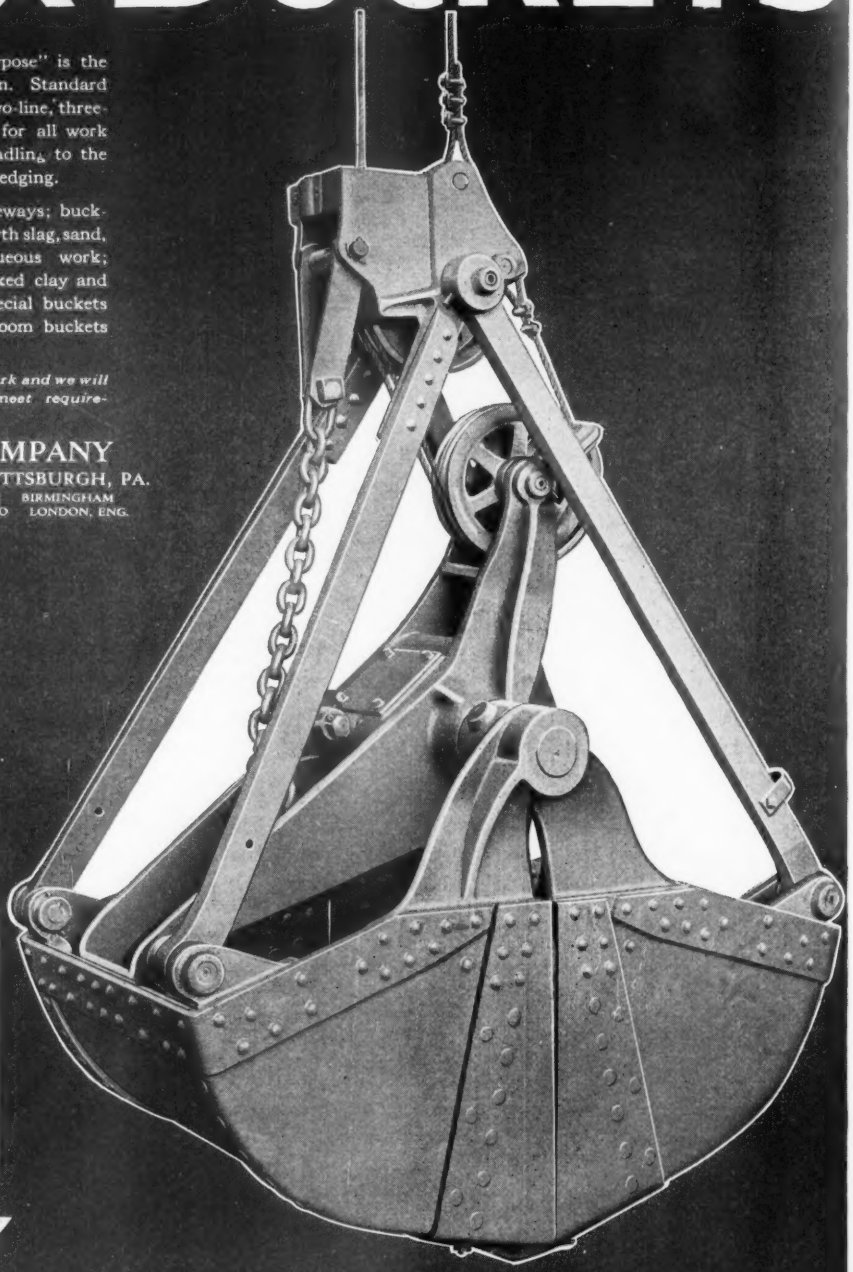

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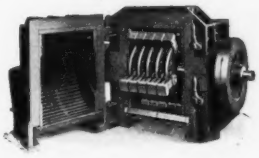

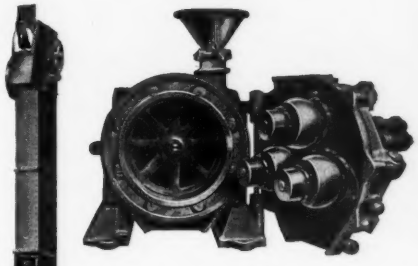

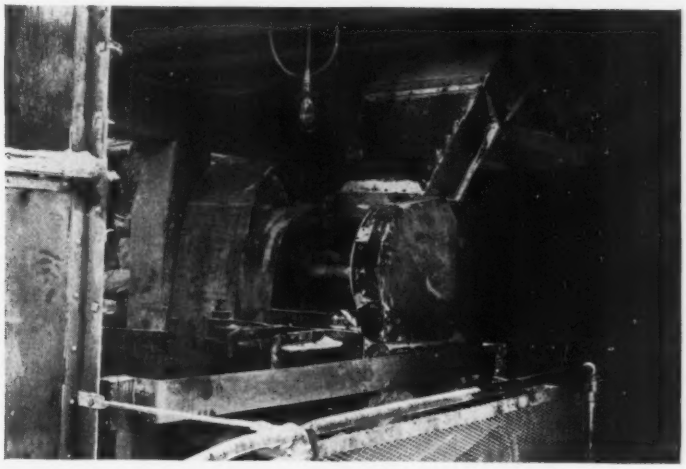

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They appreciate that "Open Door" accessible machinery is the least expensive in the long run, because it reduces delays to a minimum, thus increasing the operating time.

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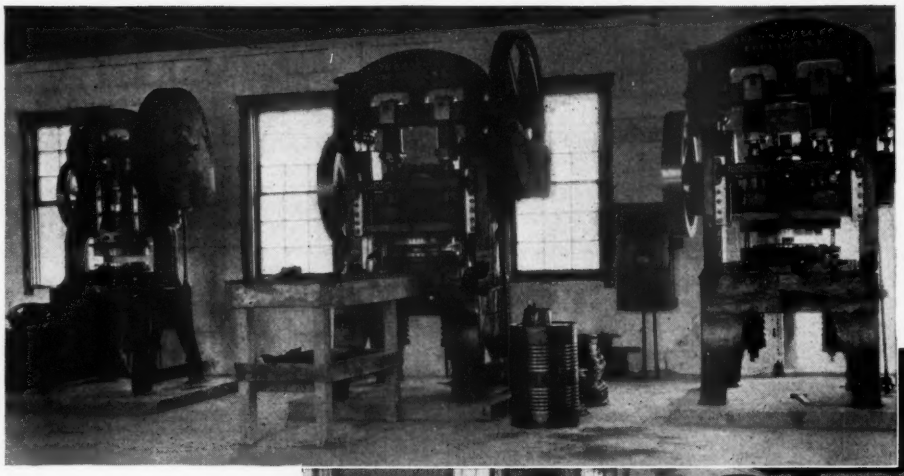

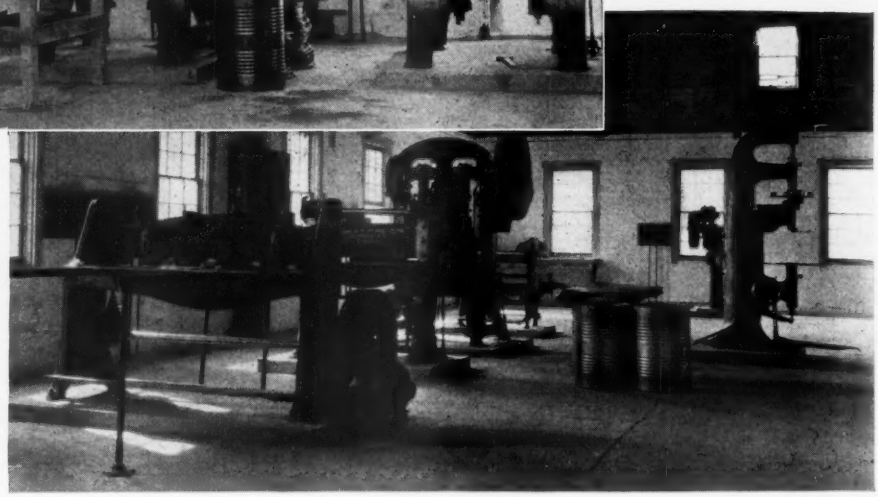

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Following their plans for maximum efficiency in a modern lime plant, the American Lime & Stone Company have installed "STOLL" Machinery for the production of atmospheric proof steel barrels in which their lime products will be shipped.

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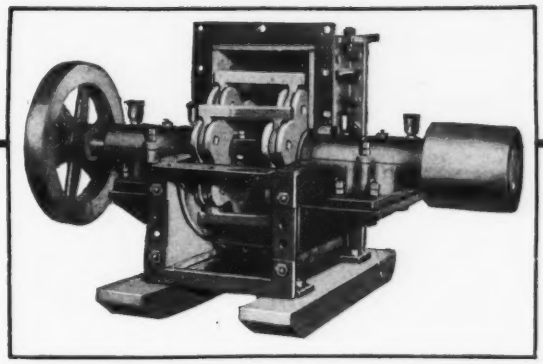

Interior of "K-B" PULVERIZER showing removable Manganese Steel Lining Plates and Patented Hammers

The "K-B" PULVERIZER is built with one idea in view — to fill the demand for a strong and efficient machine to pulverize, *at a low cost,* moderately hard materials.

The efficiency of any machine lies in its ability to do a large amount of work with a small consumption of power.

The "K-B" does this!

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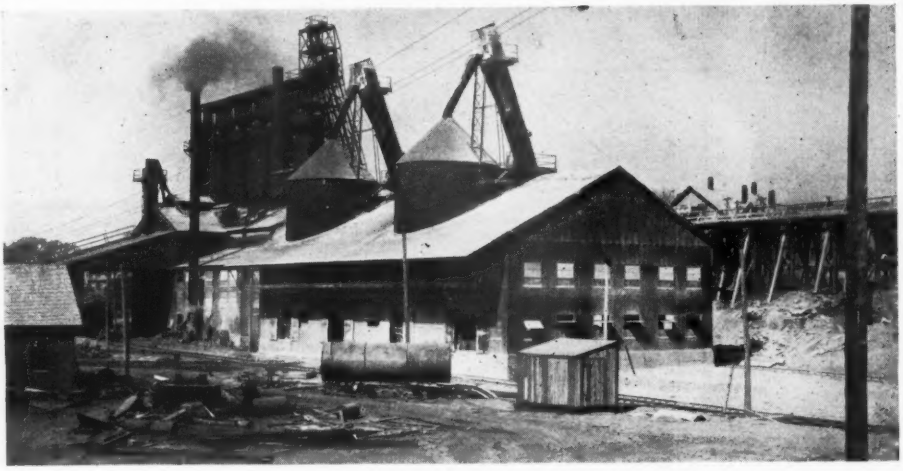
MORSE SILENT CHAIN DRIVES

THE MORSE "ROCKER JOINT"



At the Rockland-Rockport Plant

As the efficient operation of this wonderful plant depends on the fans, so the efficient operation of the fans depends on the Morse Silent Chain Drives, so also the efficient operation of the Morse Chain Drives depends on the Rocker Joint.

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The Morse Silent Chain Drive is positive in action, and will give you just the sort of service you have wished for.

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THE handling of sand and gravel demands that type of equipment which will withstand the excessive wear and tear characteristic of these materials.

Webster equipment is built to meet the exacting demands of this service. Each part is ruggedly built as well as accurately designed to give long life with low upkeep and maintenance costs.

Our Engineers have specialized in this work and are qualified to recommend suitable equipment to meet your needs. Every Webster plant is designed to produce a high grade product which will secure preference in the market. This is true of the smallest as well as the largest of Webster plants.

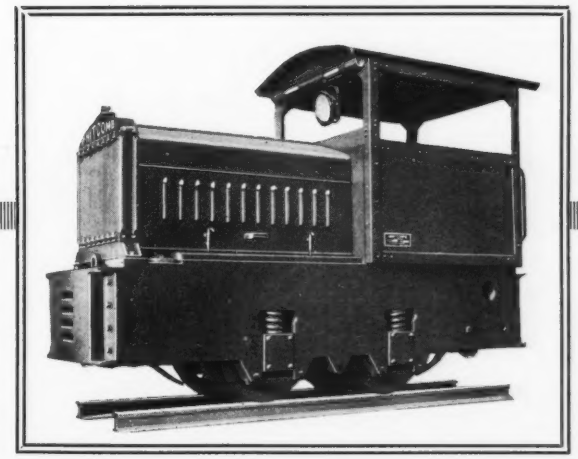
If you are considering the building of a new plant or changes in your present equipment, talk over your plans with our engineers; they are at your service.

THE WEBSTER MFG. COMPANY

4500-4560 CORTLAND ST., CHICAGO

Factories-Tiffin, O. *and* Chicago – Sales Offices *in* Principal Cities

When writing advertisers please mention ROCK PRODUCTS



To the Lime Producers—

The efficient and economical haulage of your limestone, bears an important part on the efficient and economical operation of your plant.

It is obvious that a locomotive quick in action, provided with ample power and can keep your shovel and crusher steadily employed, helps mightily in cutting the cost of production.

We have any number of lime producers among our list of users who will gladly tell you how well satisfied they are with their "Whitcomb" and after all, the user, with the experience is the man who knows.

Let us give you a few names—
they will tell you

GEO. D. WHITCOMB COMPANY

ROCHELLE, ILLINOIS, U. S. A.

DESIGNED TO WORK

GASOLINE STORAGE BATTERY WHITCOMB LOCOMOTIVES TROLLEY COMBINATION

BUILT TO OVERWORK

When writing advertisers please mention ROCK PRODUCTS

ENDURINGLY EFFICIENT

TRAYLOR
Bulldog Gyratory Crusher

The instant choice of the superintendent who knows crushers as they were before the BULLDOG made its bow—because it is on the job as long as the power is on, and plugs away, producing at maximum capacity, gives no trouble, uses the minimum of power, wears very slowly inside, and altogether inspires a comfortable feeling in its possession.

Users have learned to value these distinctively BULLDOG FEATURES

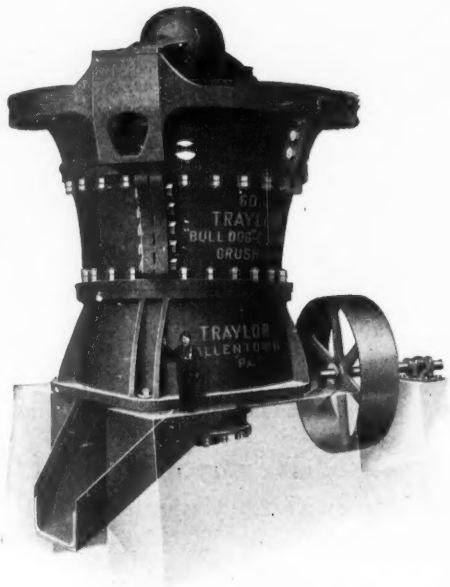
The Non-Deflecting and Unbreakable Shaft.

The Smooth-Running Cut Steel Driving Gears.

The Extra Long Self-Aligning Eccentric.

The Hewes Bar-Type Non-Weaving Spider, and, most of all,

Absolute Dust Exclusion from the Inner "Works."



BULLETIN GXIR YOURS FOR THE ASKING

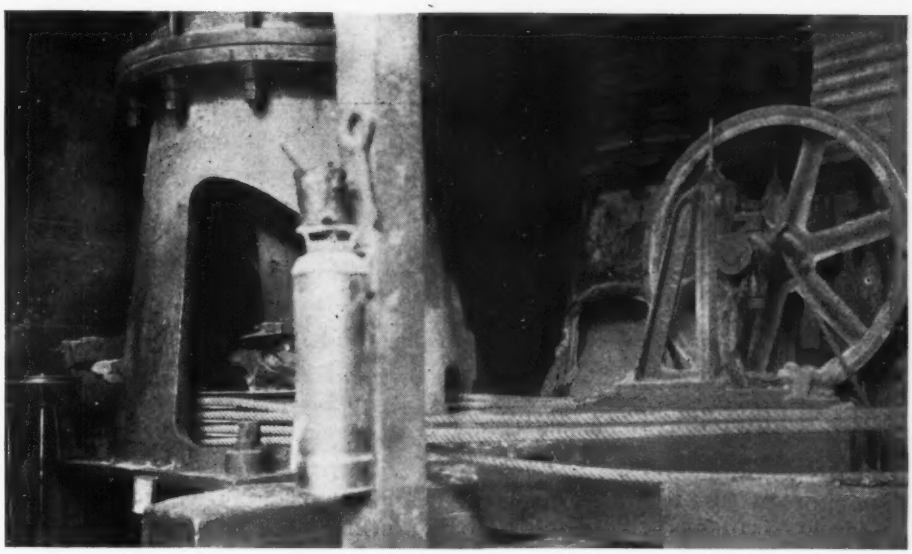
TRAYLOR ENGINEERING AND MANUFACTURING COMPANY
ALLENTOWN, PA.

NEW YORK 30 Church St. | PITTSBURGH 1133 Fulton Bldg. | CHICAGO 1414 Fisher Bldg. | LOS ANGELES Citizens Nat. Bank Bldg. | SPOKANE 616 Mohawk Bldg.
BIRMINGHAM Brown-Marx Bldg. | NEW ORLEANS 1215 New Hibernia Bank Bldg. | SALT LAKE CITY 111 Dooly Bldg. | TIMMINS, ONT., CAN. Moore Block
TRUCK AND TRACTOR DIVISION, CORNWELLS, PENNA.

EXPORT DEPARTMENT, 104 PEARL ST., NEW YORK CITY. CABLE ADDRESS "FORSALTRA"

International Machy. Co. SANTIAGO, CHILE | W. R. Grace & Co. LIMA, PERU | International Machy. Co. RIO DE JANIERO, BRAZIL

KENNEDY
Gearless Crushers



At the Pittsburgh Plate Glass Co. Sand Plant

These two No. 37 Kennedy Gearless Crushers, at the Ford City, Pa., plant, take the oversize from the screens (over 1 1/4 in.) and reduce it to 1 in. and under. The crushers run at 303 R.P.M. and have a capacity of from 45 to 70 tons of stone per hour.

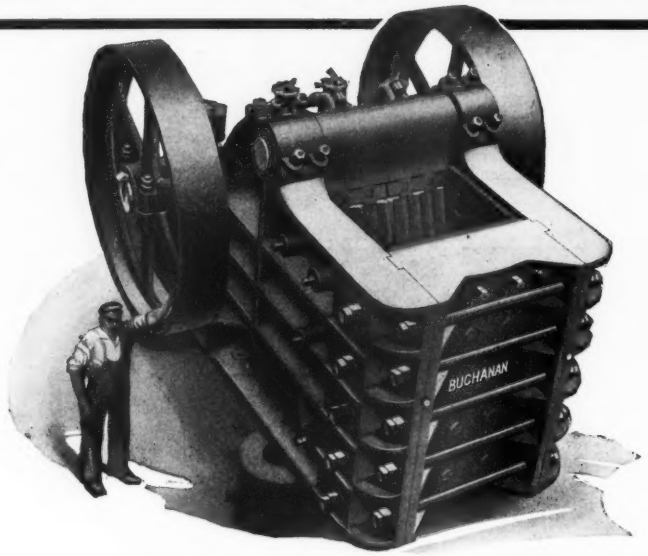
The selection of the Kennedy at this plant was made after a careful investigation and this choice, made for one of the largest and most modern sand plants in the country, is a convincing reason why you should investigate the advantages possessed by the gearless crusher.

You cannot afford to disregard the universal satisfaction among Kennedy owners. Consult us on your crushing problems.

Specify KVS Products

Kennedy Van Saun Mfg. & Eng. Corp.
120 Broadway, New York
40 Rue des Mathurins, Paris

Buchanan All-Steel Jaw Crushers



Type "C" Buchanan Jaw Crusher

THE precision that goes into Buchanan Jaw Crusher manufacture is reflected in years of continuous service.

All-steel construction, careful attention to every detail, exact machine work, and experience in design that dates back to the very first crushers of this class—these are the factors that enable Buchanan Crushers to stand up to utmost crushing requirements and deliver the output expected of them.

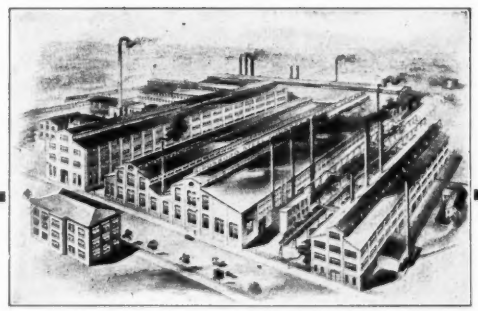
Buchanan All-Steel Crushers are made in sizes up to and including 66 in. x 84 in.

Send for Bulletin

C. G. BUCHANAN COMPANY, Inc.

Cedar and West Streets **New York City**

Southwestern Representative
David B. Dunn, Inc.
1226 East Eighth St., Los Angeles, Calif.

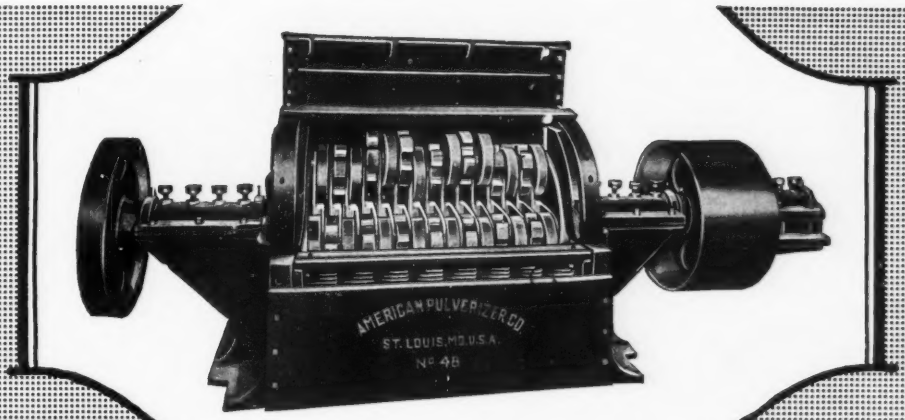


—Q.?

Where are Buchanan Crushers built?

A.—Every part of the Buchanan Crusher is made in Birdsboro, Pa. From blast-furnace through steel-foundry and machine-shop to erecting and testing floor, every operation is under the direct supervision of the C. G. Buchanan Company.

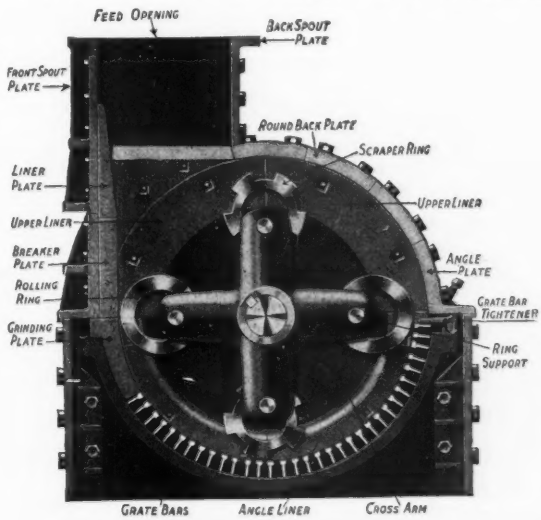
The large capacity of the Birdsboro plant for heavy work is assurance to the Buchanan Crusher buyer that orders will go through promptly and without delay.



Meet the Demand for Agricultural Limestone

There is an ever-increasing demand for agricultural limestone, a product that answers the same purpose as burned lime, yet sells at less than half the price and leaves a very satisfactory margin of profit.

The American Ring Pulverizers, because of their ruggedness and power, their strength and wear-resisting qualities, are capable of earning big returns, grinding limestone for this purpose.



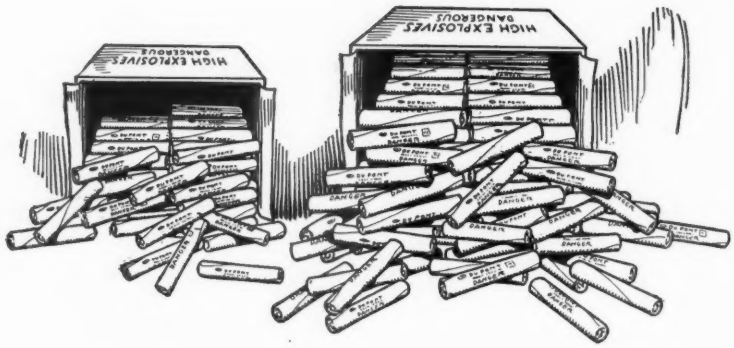
It is a superior machine capable of reducing Limestone to the desired fineness for agricultural purposes with the low cost of upkeep and power.

It will pay you to learn about the great possibilities of this business and we would be pleased to send you full particulars.

AMERICAN PULVERIZER CO.

18th and Austin Sts. **ST. LOUIS, MO.**

1/3 more per dollar



THE DU PONT COMPANY leads the way in the production of more efficient and more economical explosives. In Dumorite, its latest achievement, it has made possible

a great step in the reduction of explosive costs

Dumorite is a new money-saving dynamite which gives you over ⅓ more work for your dollar—a guncotton-nitroglycerin dynamite without a headache—a non-freezing dynamite which can be used successfully at any temperature.

Dumorite has approximately the same strength as 40% dynamite and does the same work, stick for stick. And you can buy 135 to 140 sticks of Dumorite at the same price as 100 sticks of 40%.

Ask the du Pont Explosives Service Department through our nearest branch office how Dumorite can be used in your work. Ask that question in a letter outlining your requirements. Find out how this new development in explosives manufacture can cut your blasting costs for 1922.

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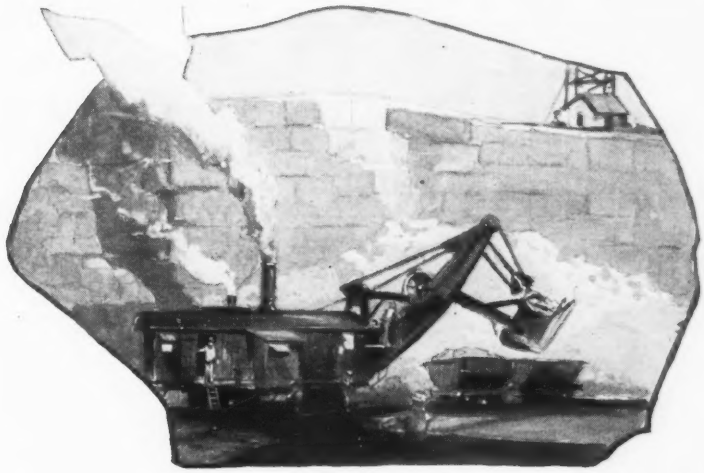
NON-HEADACHE DU PONT NON-FREEZING

DUMORITE



Not what it costs per pound But what it produces

THE cost of explosives isn't measured by the cost per pound but by the blasting cost per yard or ton of material blasted.

An explosive that pulls clean to the very bottom, minimizes your secondary shooting and permits uninterrupted operation of your shovels, etc.—that's really the cheapest explosive you can use.

There is a grade of Grasselli Dynamite that will do that for you. One of our representatives, a practical quarry man, will be glad to call and discuss your proposition with you at any time you suggest.

The Grasselli Powder Company

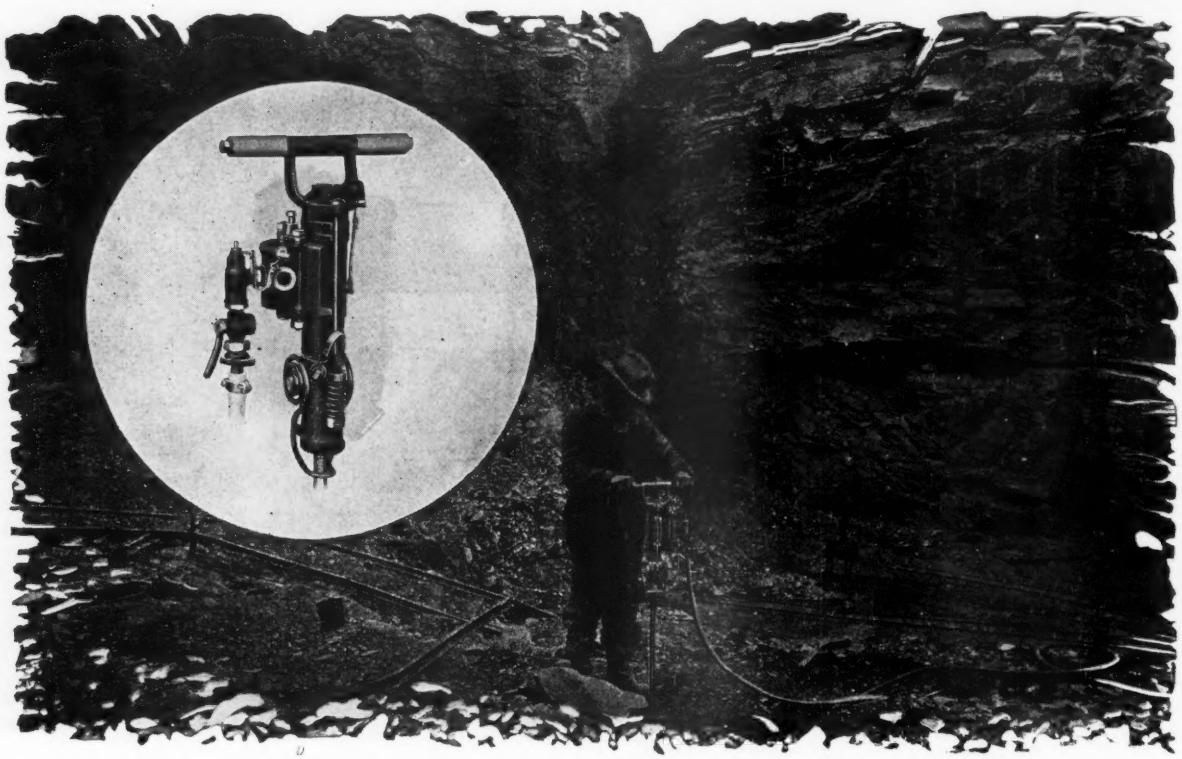
Main Office: Cleveland, Ohio

Chicago
Pittsburgh
Philadelphia
Birmingham

Pottsville, Pa.
Uniontown, Pa.
Wilkes-Barre, Pa.
Bluefield, W. Va.

Explosives and Accessories That Fit the Job

Just the right size for a long day's drilling



THE "Jackhamer" is a superior type of self-rotating hand-held rock drill. It has established an enviable reputation for fast drilling, low upkeep cost and durability.

The "Jackhamer" is now made in five sizes. The three largest ones are made for use with steam or compressed air. These may also be equipped with arrangement for feeding water as well as air through the hollow piston and drill steel to the bottom of the drill hole to allay the dust and remove the cuttings.

BAR-33	**"Jackhamer" — 21½**	**lbs.**
BBR-13	**"Jackhamer" — 35**	**lbs.**
BCR-430	**"Jackhamer" — 42**	**lbs.**
DCR-13	**"Jackhamer" — 55**	**lbs.**
DDR-13	**"Jackhamer" — 70**	**lbs.**

The weight of a hand hammer drill is a very important consideration. It should be light enough to be easily lifted, handled and carried by one man; yet it should be sufficiently heavy to do its work properly, withstand the strains of that work and to operate with a minimum of vibration and fatigue to its operator.

Taking your work into consideration with the five sizes of "Jackhamers" as listed, you will find that there is one "Jackhamer" of just the right weight for your work.

Bulletin 4046

INGERSOLL-RAND COMPANY, 11 Broadway, New York

Offices Everywhere

252-JD

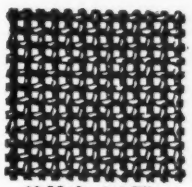
Ingersoll-Rand

"CLEVELAND"
DOUBLE CRIMPED
WIRE CLOTH

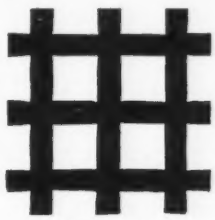
Uniformity Assured—

No other wire cloth on the market assures the uniform fineness that is secured by the use of "Cleveland" Double Crimped Wire Cloth.

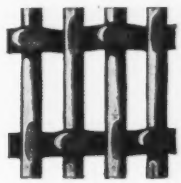
Back of this essential assurance, is the material quality of our product that makes it unequalled for the screening of sand, gravel, crushed stone, lime or other materials.



1¢ Mesh; .047 Wire



2½ Mesh; .105 Wire



No. 23—Rolled Slot

The ability of this product to withstand the severe service imposed on it by the very nature of the materials screened, has earned for it a reputation second to none in the country.

A large stock always on hand. Any special mesh will be manufactured to suit requirements and the price is always right.

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3573 East 78th Street **Cleveland, Ohio**

NON-METALLIC MINERALS

Lime Production

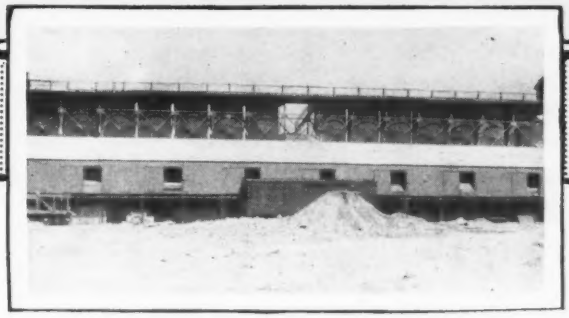
As it is generally considered that the Lime Industry is in its infancy, this seems to be the proper time to ask the various lime producing organizations what they are doing in the way of research to utilize waste quarry materials, the recovery of CO_2 and other gases, and the rectification in their product to meet the demand of the market most easily approached.

There is a market for practically any lime, if the product indicates the best treatment of the raw materials in hand; and it is for this reason, producers must pay more attention to the quality and the sorting of the stone, in order to insure uniformity in the finished product. Then the arrangement, and co-ordination of the various working units and pieces of equipment, must be designed to meet particular requirements, to such an extent, that the plant becomes one vast machine with great flexibility; and if you will add to this, the highest fuel efficiency, the plant must pay dividends.

Common sense, combined with all technical data pertinent to the situation, will work wonders in the way of bringing the lime industry to a higher plane, and with this point in view, the Waller Crow Organization, with its wide experience in applying method and conservation, with its technical knowledge and creative thought, offer its services in the further development of your plant or property.

WALLER CROW, INC.
Engineers
COUNSELLORS IN INDUSTRIAL OPERATION & FINANCE
327 S. LA SALLE STREET • • CHICAGO

ARNOLD & WEIGEL
CONTRACTORS & ENGINEERS



Fourteen in a row
(count 'em)

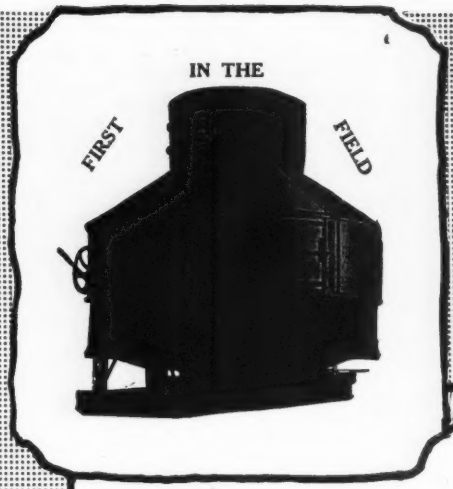
It is evident that the Kelley Island Lime & Transport Co., Cleveland, O., are entirely satisfied with "ARNOLD" built kilns.

The above plant, located at White Rock, O., was remodeled with "ARNOLD" features in 1920. We are now completing in record time ten "ARNOLD" Kilns at this company's Gibsonburg plant.

Our broad experience and modern construction methods enable us to install these linings in various size kiln shells at a minimum expense.

Send us information regarding your present kilns and we will make suggestions as how to increase your capacity. No obligations

WOODVILLE · · OHIO



The CLYDE Lime Hydrator

First in the Field

Not only first in the field, but still first choice of lime operators because of its dependable and economical performance.

Over 90% of the Hydrate of America is produced by the Clyde. It makes the best quality of finishing lime from either high calcium or magnesium and produces big capacities at only three-fifths the cost of any other hydrator on the market.

Simple, easiest to operate and most economical in cost of installing, maintaining and operating.

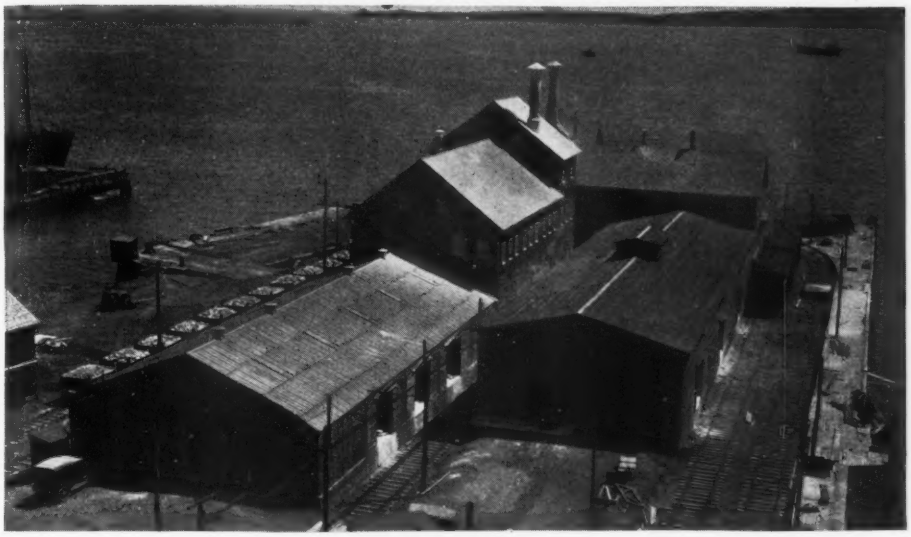
Send for Catalog

H. MISCAMPBELL

Patentee and Sole Manufacturer

April 3, 1900—Serial No. 646544 Oct. 10, 1905—Serial No. 801329
Nov. 29, 1921—Serial No. 1398238

DULUTH MINNESOTA



Hydrating Plant

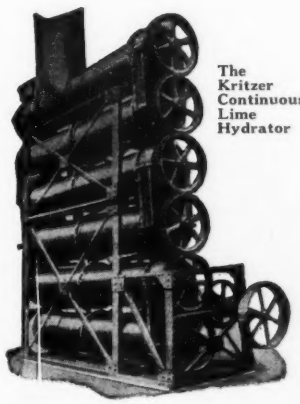
Two KRITZERS
At This Plant

It was unfortunate that the lime convention was not held in New England, that every producer could make a trip to the Rockland-Rockport plant.

The engineers of this plant have taken advantage of every feature in equipment and machinery that tends toward economy and efficiency in production, and the plant as it stands today is perhaps the most scientific plant in the world. It is for this reason we point with pride to the two Kritzer Continuous Lime Hydrators that are now part of the plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

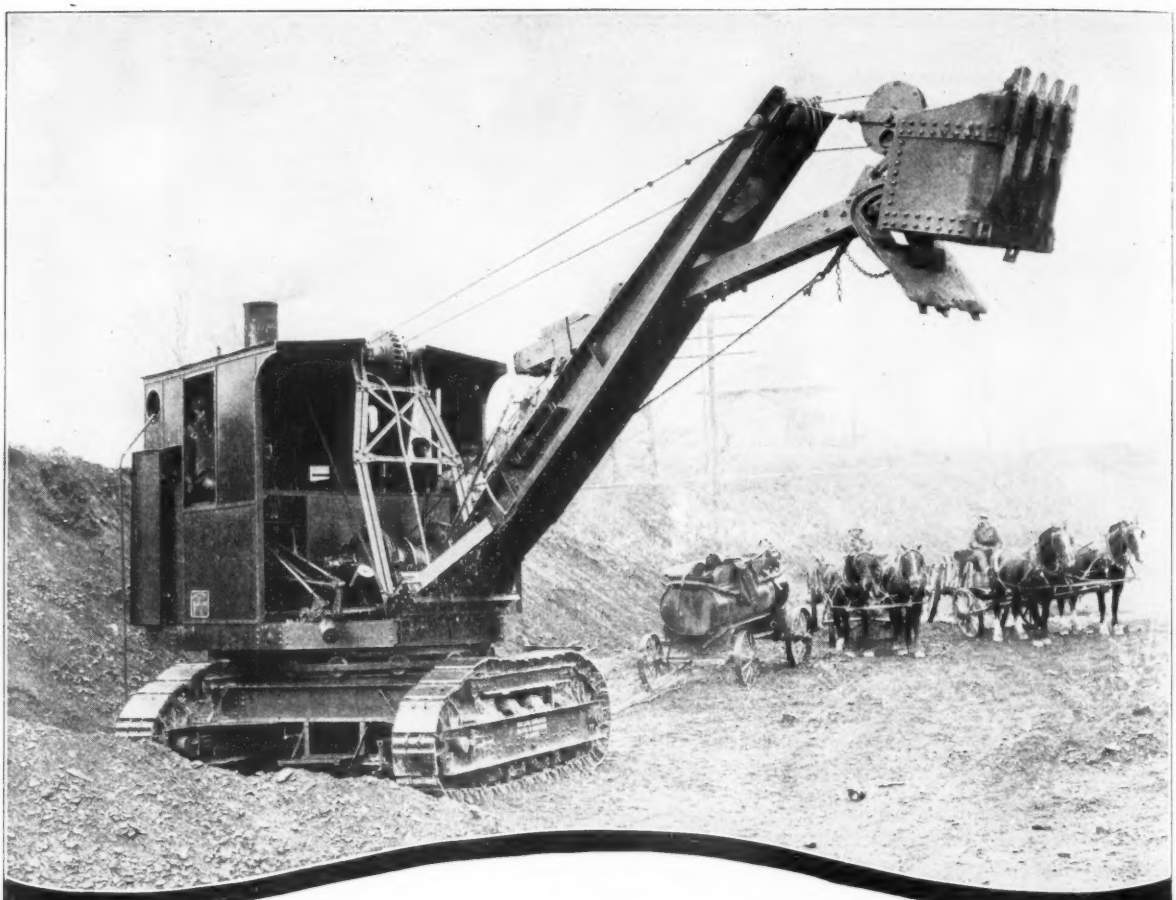


The Kritzer Continuous Lime Hydrator

6 Modern Mount Kilns

THE KRITZER COMPANY

503 S. JEFFERSON **CHICAGO, ILL.**



The Day for unmarked wire rope will soon be at end.

More and more superintendents responsible for the safety of their equipment and the lives of their workmen are turning to

WILLIAMSPORT WIRE ROPE

and the protection their Telfax Tape Marker affords.

They realize that the Telfax Tape Marker identification of **each** grade is a protection worthy of their highest endorsement.

Write to us today for conclusive facts about this super-quality product. Ask us for prices. Let us show you now why it is to your best interest to use Williamsport, the wire rope you'll eventually buy.

WILLIAMSPORT WIRE ROPE COMPANY

"accepted as the best"

Main Office and Works
Williamsport, Penna.

Gen'l Sales Office
Peoples Gas Bldg., Chicago

The fastest growing wire rope plant in America

Lime In Small Packages!

THERE is a tremendous potential market for Lime in small packages for household and garden use. The Lime manufacturer who individualizes his particular brand will gain gratifying results.

The most important factors in successfully merchandising Lime are the brand and the package. With your brand attractively printed in bright live colored inks on Adams Neverburst White Enameled Sacks your product dominates the dealer's shelf with sales punch in every sack. The white enameled surface offers a base for effective color blending that appeals and commands favorable attention.

Analysis and Instructions can be clearly and attractively printed on the back of the sack—a decided improvement over insert slips. The brilliant white enameled surface of Adams Neverburst Bags sheds dust and lime siftings, making them fresh and clean at all times—an invitation to women buyers as well as men. Not being sealed at the top, the sacks can be conveniently opened and closed—a feature favorable to the small user.

Adams Neverburst Bags are manufactured from high grade manila rope fiber paper and will withstand the rough handling of long distance shipping. They deliver the contents intact.

Made by The Adams Bag Company of Cleveland, Ohio, whose name, since 1858, has been associated with the highest quality products in the manila rope paper sack industry.

We invite you to write to us if you are interested in this latest development of marketing lime.

Ask for samples

THE ADAMS BAG COMPANY

ESTABLISHED 1858

Main Office: Cleveland, Ohio
Mill and Factory: Chagrin Falls, Ohio

Adams Bags
NEVERBURST
Deliver The Contents Intact

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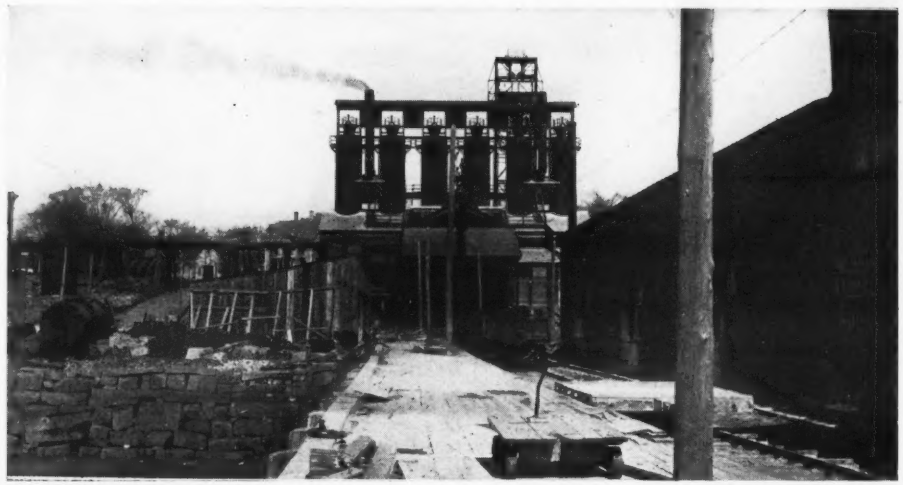


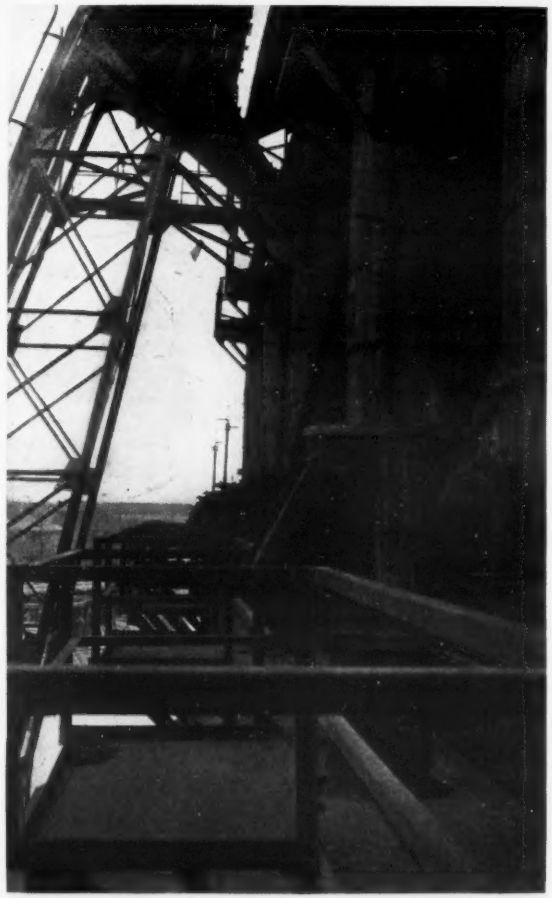
The Rockland-Rockport Plant

An engineer who has visited many plants throughout the country, recently made a trip through the Rockland-Rockport Lime Plant, and after he had thoroughly inspected every detail of the equipment and process, he made the positive statement that the Rockland-Rockport was the most efficient and scientific Lime plant in the country.

This plant is the pet child of our brain. We put all the effort and the skill we were capable of in its design and construction. Many theories have been practically applied to the working conditions, and as a consequence, results have been unequalled.

The kilns are capable of fine and delicate control, giving an unheard of fuel efficiency, and the plant is practically automatic in its operation, reducing labor requirements per

The kilns are capable of fine and delicate control, giving an unheard of fuel efficiency, and the plant is practically automatic in its operation,

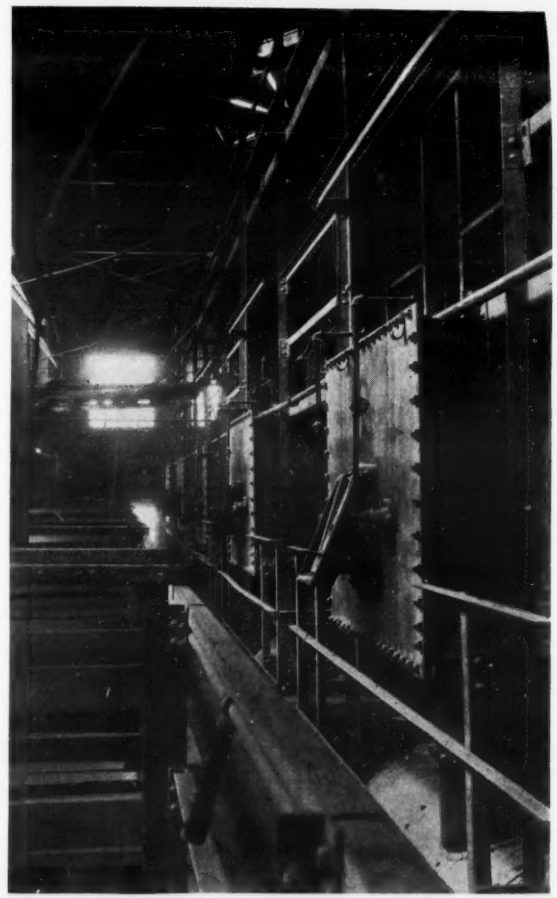


reducing labor requirements per ton of output, far below that obtained heretofore.

We know the efficiency and economy of this plant is unequalled. This, as a fact, is being demonstrated day after day, and if you and your associates are considering the production of lime, it will pay you to investigate the results obtained at the Rockland-Rockport plant.

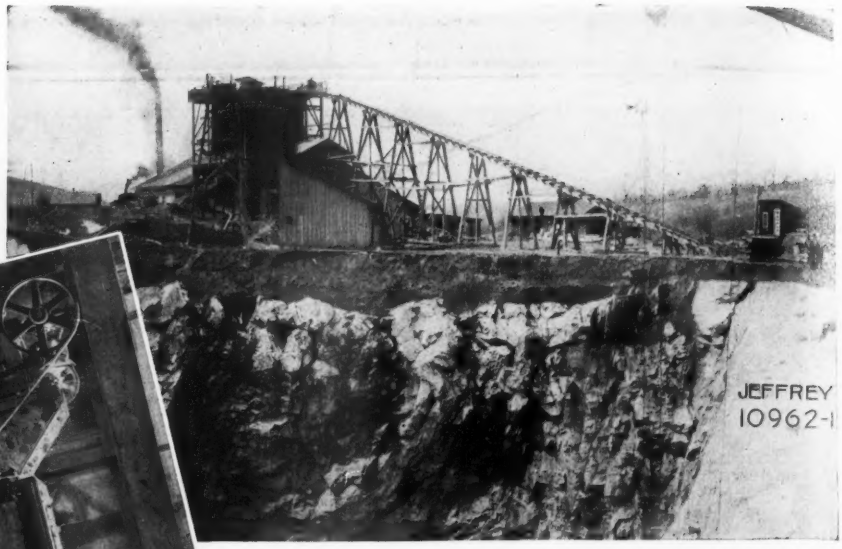
Glamorgan Pipe & Foundry Company

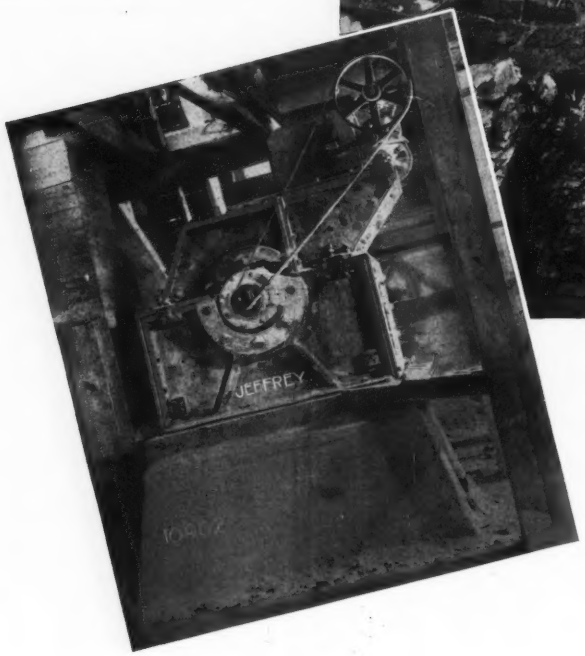
Lynchburg, Va., U. S. A.



GLAMORGAN

Jeffrey Type "D" Pulverizer in operation at the Blue Ridge Lime Company, Fletcher, North Carolina.





Especially Adapted For Making Agricultural Limestone

Manufacturers of Elevating and Conveying Machinery for handling all kinds of materials, Portable Bucket Loaders, Portable Belt Conveyors, Chains, Buckets, Sprockets, Crushers and Pulverizers; Electric Trolley and Storage Battery Locomotives, etc.

Leading quarry owners are equipping their plants with the Jeffrey Type "D" Swing Hammer Pulverizer to meet the constantly increasing demand for ground limestone.

Write for new Pulverizer Catalog No. 368-C

The Jeffrey Mfg. Co. 935-99 NORTH FOURTH ST. **Columbus, Ohio**

JEFFREY
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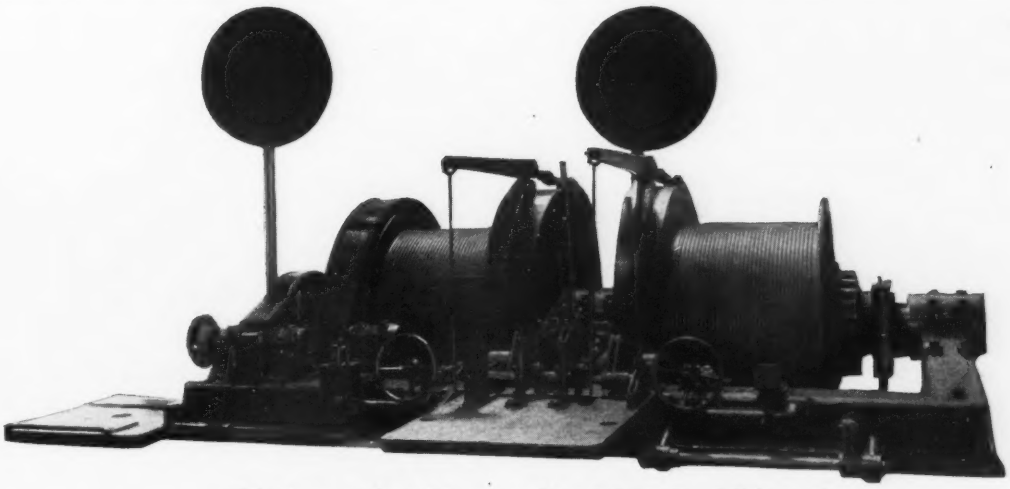

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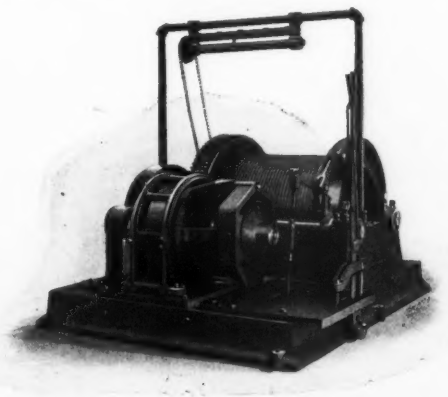

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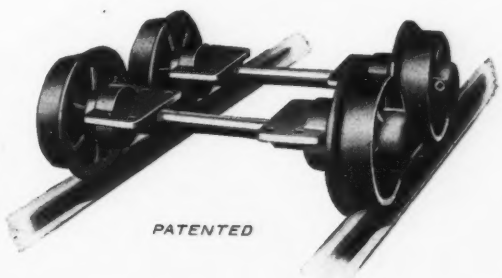

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Gasoline Locomotives

Rock Products

Volume XXV | Chicago, June 17, 1922 | Number 12

The New Rockland Lime Plant

Ironing Out the Wrinkles in the Country's Most Remarkable Lime Manufacturing Operation

By Nathan C. Rockwood
Advisory Editor, Rock Products

A YEAR ago this time lime manufacturers were being entertained and instructed by a description of what was to be expected of the new Rockland lime plant, then under construction. This plant, it will be recalled, comprises six continuous-discharge gas-fired Mount kilns, designed by W. D. Mount, M. E., and built and erected under his supervision by the Glamorgan Pipe and Foundry Co., Lynchburg, Va. In a great many ways it was a new departure in the lime industry and there was a good deal of skepticism on the part of lime plant operators regarding its fulfilling some of the expectations of its builders.

In the year just passed experience in operating these kilns has shown that there were, and in deed still are, many problems to be worked out in practice, which in theory were taken care of. But such is inevitably the case with every new process in industry and with nearly every new machine ever placed on the market. Fortunately the Rockland plant is in the hands of a man who has the patience, philosophy and the foresight needed to solve every problem as it comes up.

As regards its present performance the writer found the Rockland plant in the early part of May turning out from 125 to 130 tons of lime per day of 24 hours with only five kilns operating. (There are six kilns in all.) One kiln alone has been proved capable of producing 35 tons per day. The operation of the kilns comes nearer to being automatic than in any other lime plant the writer has ever visited. A crew of 10 men in 24 hours operates the entire kiln plant. This crew consists of three foremen and three gas-producer tenders (and boiler furnace men) who work one each in three 8-hr. shifts, and two kiln-skip operators and two general handy men (cleaning out flues, etc.) who work during the day shift only. There is in addition of course a plant superintendent who supervises all the work about the plant. It is not anticipated that any increase in the operating crew will be necessary with all six kilns operating and turning out a possible 200 tons of lime per day.

Quarry view at Rockland, Maine

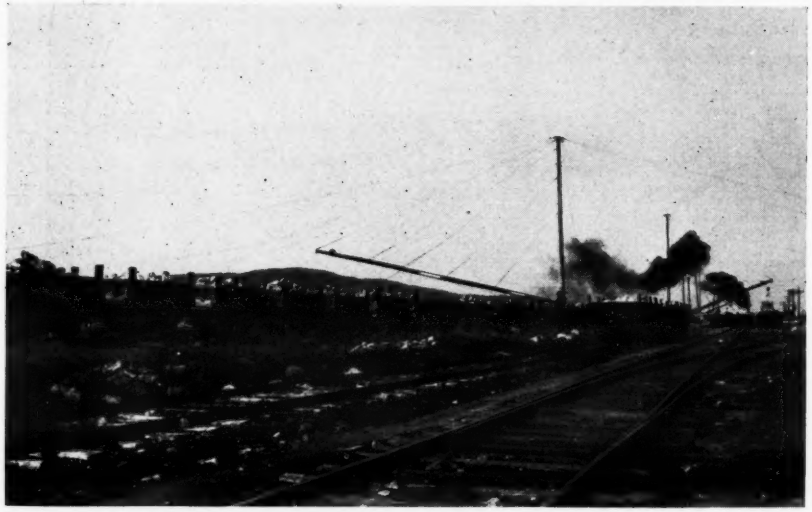
Changes in Plant Found Necessary

The changes in operating equipment found necessary or desirable begin at the crushing plant in the quarry. In the original plant the separation between kiln stone and commercial stone (less than 3-in.) was made on a shaking grizzly. This was all right so far as it went, but when it came to operating the kilns it was found very desirable to get some experience with kiln stone of various sizes. It was also found that the time taken for the stone to pass through any one particular kiln being fixed, it was quite necessary that the stone fed to that kiln be of fairly uniform size.

With a greater degree of size separation each kiln may be charged with different sizes of stone, but the size in any one kiln will be uniform. This is expected to develop not only a more

Another quarry view showing method of raising the stone

Crushing plant showing abandoned quarry at the left



Cars of stone loaded by skips ready for crushing plant

Replacing shaking grizzly in crushing plant with cylindrical screen

uniform burning of the stone in the kiln and improve the draft conditions, but also furnish some extremely valuable experience in determining the correct size of kiln stone for the various possible conditions of draft, gas feed, speed of discharge, etc.

Accordingly, the shaking grizzly has been replaced by a revolving cylindrical screen which will make, including the rejections, four separate sizes of kiln stone. Additional bin space of course had to be provided for these.

Uniformity in size of kiln stone is a point much stressed by Mr. Mount in all his discussions on this type of kiln, and experience with the Rockland stone has served to emphasize this point because different strata of the rock show quite distinct characteristics in the kiln. In this case Mr. Mount thinks that it eventually may be necessary to segregate the stone according to these characteristics, and that the plant would lend itself readily to such a scheme of operation.

Dumping trestle at bin feed the kilns

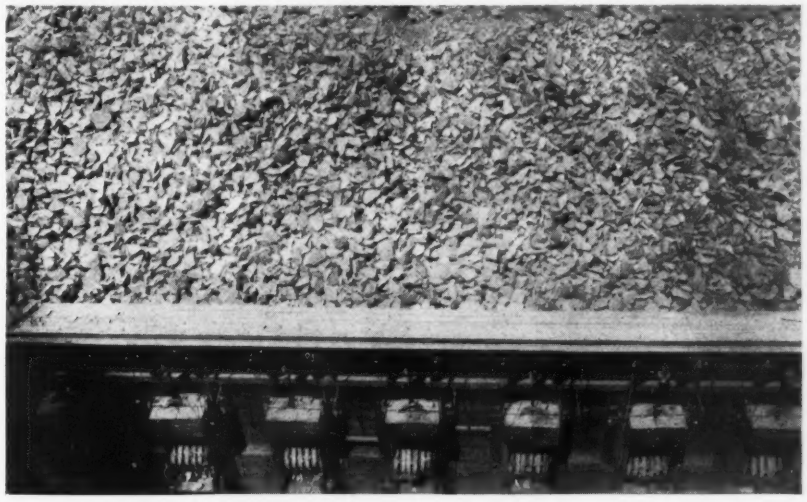
New Bin Gates

The next important change was in the bin gates which feed the kiln-charging skip. Rock is brought from the crushing plant to a dumping trestle built over a long bin, the bottom of which is a sloping embankment. The retaining wall and the bin gate openings at the toe of the slope naturally have to stand for pretty rough service.

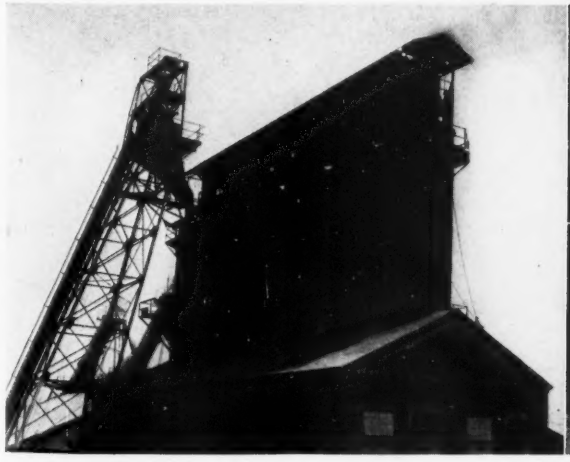
A gate had to be designed that would stand this service and cut off the flow of material into the skip under any and all conditions. This gate was designed by George B. Wood, Wm. C. Bird, general superintendent, and Ernest B. Packard and has been patented by them. It is shown in several of the illustrations and in the sketch herewith.

It is an undercut gate operated by an air-piston hoist, so rigged that when the gate segment drops the rail grillage over the gate rises simultaneously. The moving parts are attached to a counterweight which assists in closing the gate. The gates are operated, as one of the views show, by the man who rides the traveling skipway. A cord operating the air hoist hangs within easy reach of his platform.

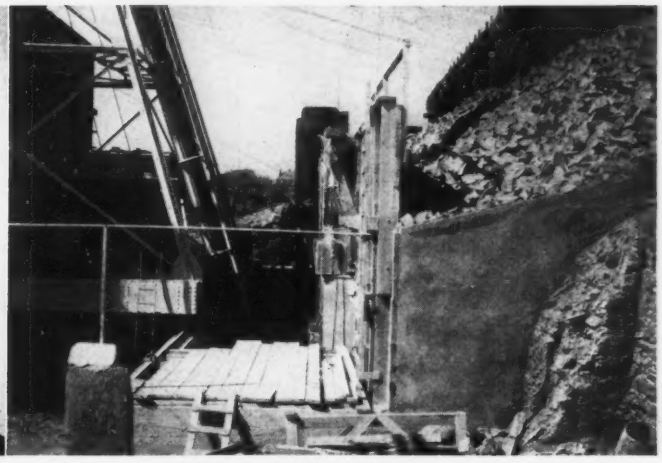
Otherwise, the kiln-charging mechanism has proved very satisfactory. There is considerable "racket" when the stone falls into the unlined bin storage part of the kilns,



Looking down on stone bin from top of kilns



End view of kilns showing traveling skipway hoist



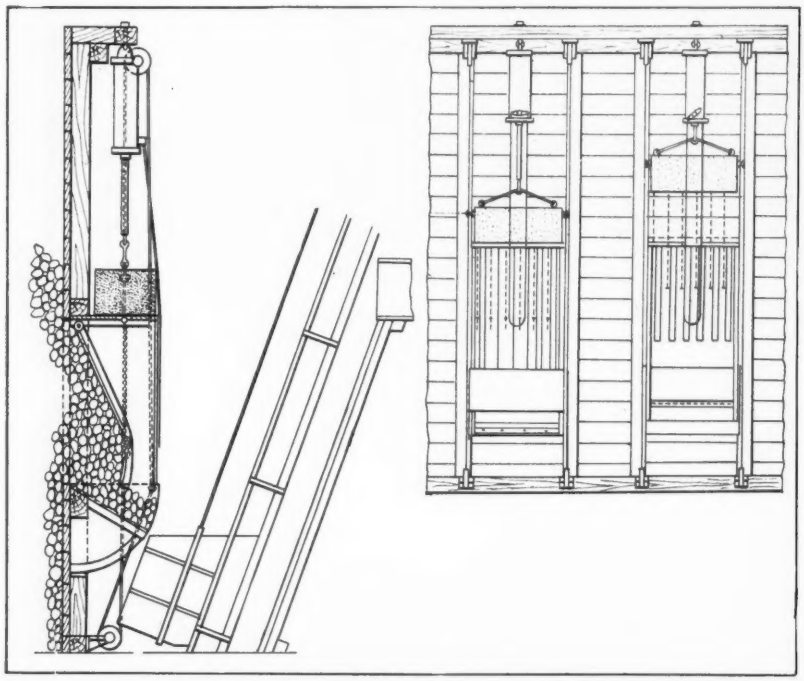
Near view of skipway and bin gates

but this can be partly obviated by keeping the bins fairly well filled.

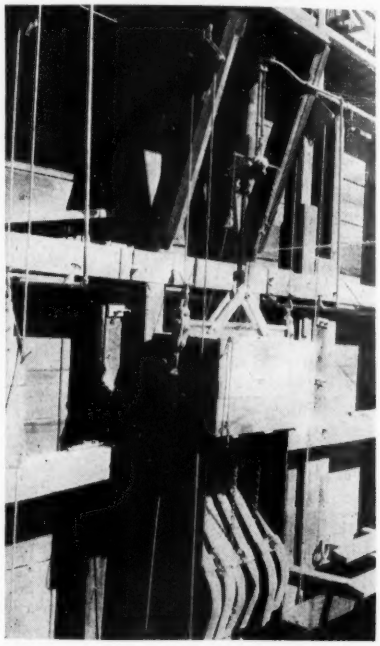
Changes in the Kilns

It was found that the two suction fans at the tops of the kilns did not provide sufficient pull for all working conditions. Temporarily they were speeded up to twice their normal rating, but are now (June) being replaced by fans of about twice their capacity. Experience has proved that it is comparatively simple to regulate the draft on a kiln if there is suction to spare, but only a larger fan can supply missing suction.

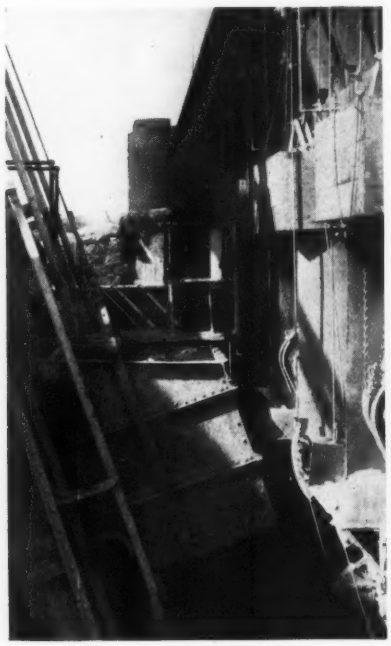
A number of minor changes at the outlet flue at top of kiln and at the gas inlet ports have been made in an effort to perfect details of operation. These are all in a way experimental and may eventually be radically modified when draft conditions are altered. Various ways have been devised to distribute the suction over the entire top of the kiln and still not interfere with the downward movement of the stone in the bin overhead. In one experiment this is accomplished by annular rings or domes which take the gases from the kilns through two



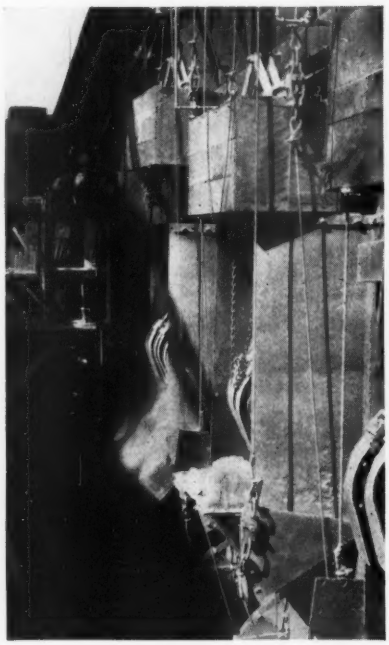
Sketch of special bin gate designed by Mr. Wood and his associates



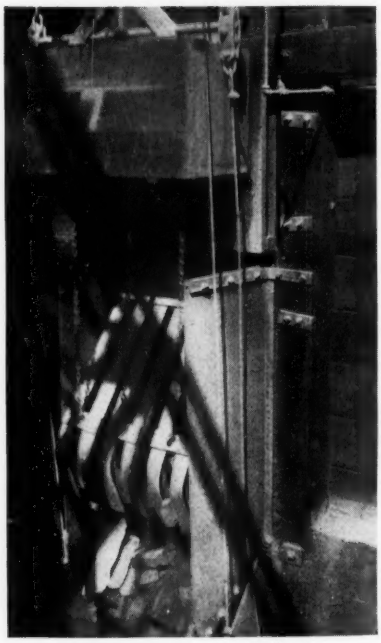
Bin gates in action, showing operating mechanism



Bin gates in action—Skip descending



Bin gates in action—Filling the skip



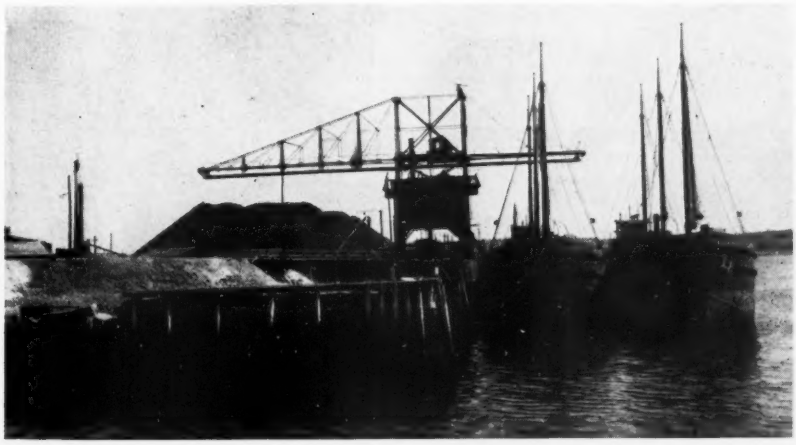
Bin gates in action—Gate closing

or more openings.

In the case of the gas ports the following experiment is being tried: The two opposite ports originally entered the kiln at a downward inclination, on the theory that the gas would dip down slightly into the kiln and come up again through the center. As a matter of fact, experience in operation showed a tendency for the gas to keep right on going down and come out as flame or smoke around the revolving discharge table at the bottom of the kiln. This tendency could have been caused by the limited capacity of the draft fans or by the attempt to carry the producer gas in the mains at greater than atmospheric pressure.

Experimentally the draft conditions in the kiln as a whole have been much improved by rebuilding the gas ports so as to have them enter the kiln horizontally instead of with the downward dip. However, it is appreciated that the increase in suction capacity referred to above may prove that the downward inclined ports are all right.

Receiving coal at hopper feeding the underground coal crusher



Insurance against coal shortage

Changing the Kiln Cross-Sections

As is well known, the kilns are of a continuous discharge type and consequently must be drawn after the manner of the "following" process instead of the "sticking" process. The kilns are only 8 ft. in inside diameter, narrowing down to an elliptical cross-section 5x6 ft. in the calcining zone. and unusually tall. The major axis of the ellipse is at right angles to the gas admission ports. It was found in operating the kilns that they at times had a tendency to stick temporarily, in which case it was necessary to let the kiln cool off somewhat, when the inside would drop.

The "sticking" is probably a result of several factors, including, perhaps, the size of the stone and the state of the lining, but it has been about decided that there will be less tendency to stick if the kilns are made cylindrical throughout their height, and the kilns being relined are so reconstructed.

Boiler Taken Off Gas Producers

The operating plan contemplated the use of producer gas under the boiler, and the gas main supplying the kilns was tapped opposite the boiler for this purpose. The original scheme contemplated the use of the excess gas of the two producers as boiler fuel, until such time as the other four kilns should be added and a demand for all the gas be thus created. However, experience showed that draft conditions on the boiler were radically different from those desirable on the lime kilns and attempts to control both simultaneously were not successful.

Accordingly, the gas connection for the boiler was removed and the boiler is now fired by a mechanical stoker using coal from the same overhead bin supplying the gas producers. The boiler installation as it now exists is a very efficient one, both in fuel economy and the labor economy in taking care of it. (The gas-producer operator looks after the boiler.)

View of the completed Rockland plant—Lime storage and packing house in the foreground

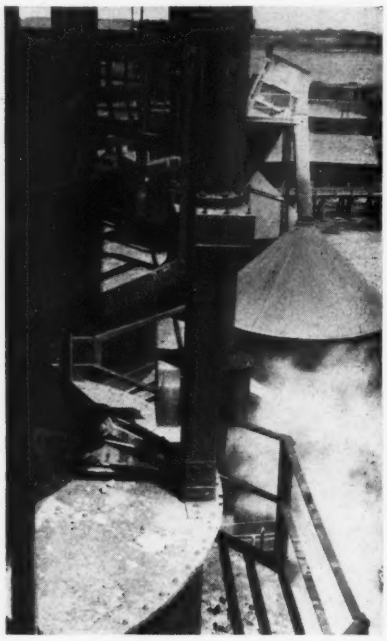
Before being elevated to the bin over the gas producers the coal is put through a crusher and screened. The screenings, or slack, go into a separate compartment at the end of the bin and are used for boiler fuel. The screened coal only is used in the gas producers, which makes their efficient operation much simpler.

The gas-producer installation as a whole has proved eminently satisfactory. It has been found that only one of the gas producers is required for the whole battery of six kilns, leaving the other one to be used in an emergency. The producer-gas installation was made plenty large because the original plans for the ultimate operation call for four more kilns, two at each end of the present plant.

Handling the Lime

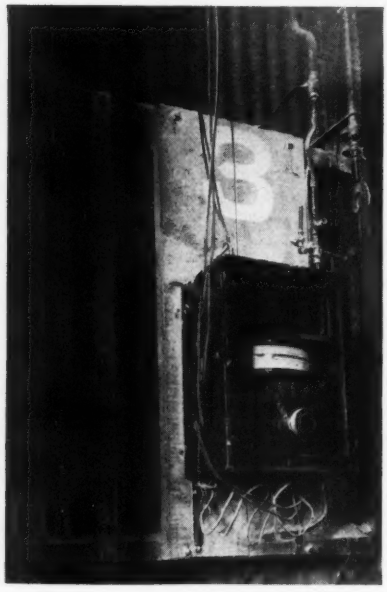
The kilns discharge automatically and continuously to a pan conveyor, parallel to the line of kilns, leading to the packing house and lime storage bins beyond. With certain minor changes in the discharge table

Suction inlets, or draft tubes, at top of kilns proper—Space over these is stone storage



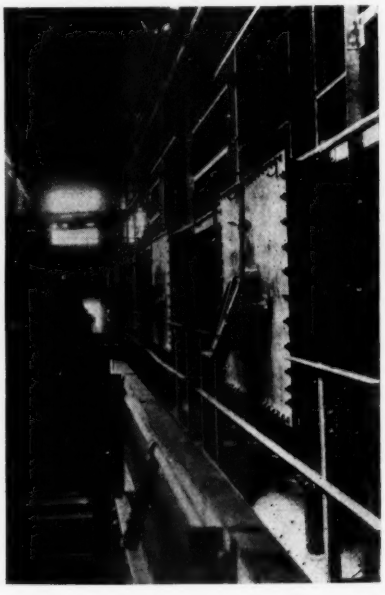
Counterweight and lever mechanism operating self-closing stone gates, or valves, on tops of kilns

Near view of draft connection showing thermocouple of pyrometer in place



Pyrometer and draft indicator combined—Shows flue gas temperature and draft at the same time

Cone valve in top of kiln stone-storage bin



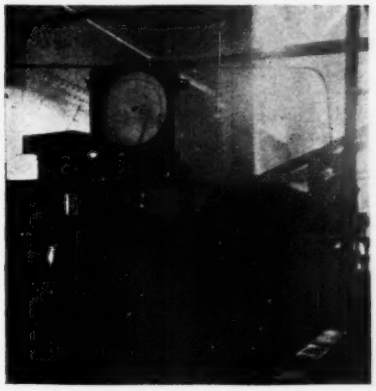
Gas ports—water cooled—by means of a dial on the runway above are capable of very delicate setting

mechanism this feature of the plant works admirably.

The conveyor was originally designed to be a picking table from which rejections would be thrown aside and only the good lime left to go to the bins. Temporarily, due to the rather experimental nature of the kiln operations, the picking process has been reversed and the soft burned lime is picked off the conveyor and the ordinary run of the kilns goes to the bins. This makes it impossible to compare the whole operation of the plant with others at the present time. This condition will be changed when the kilns are operated, as they eventually will be. There is now selected, according to Mr. Wood, about 30 per cent A-I finishing lime, the rest being reserved for mason's lime and the hydrating plant.

Control of Kiln Operation

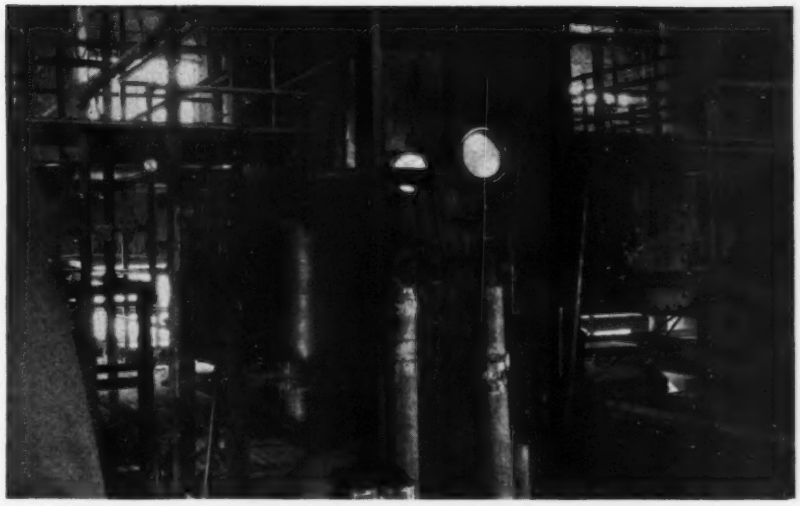
Originally there were two pyrometers on each kiln; one thermocouple was periodically extended into the kiln at approximately the fire-zone level through one of the peep holes; the other is in the exhaust-gas flue where it leaves the kiln. It was found difficult to maintain the pyrometer in the kiln and the temperatures at the particular time and place meant little, so now the pyrometer location is being changed after the manner described and illustrated in Rock Products, January 1, 1921. Four holes have been drilled at the fire zone with four couples on four different quarters of the kiln. The couples in these holes do not extend into the kiln where they might be injured by falling lime. They register about 800 deg. C. for a true kiln temperature of about 1050 deg. C.



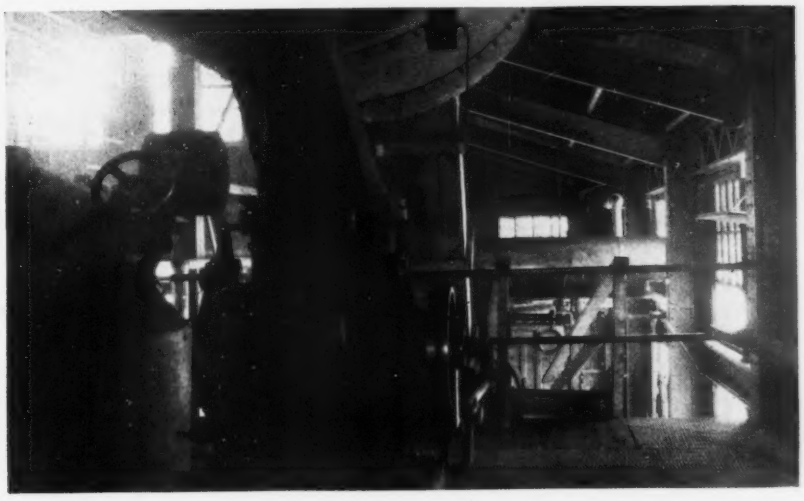
Recording gage (gas and steam) on producer-gas regulator

The pressure and quantity of the gas from the producers are automatically regulated and recorded by a type of regulator hitherto unknown to the lime industry, but used with gas producers in the steel and glass industries. (A description of this machine will be found in the "New Equipment" department of this issue.)

Regular analyses of the producer gas and

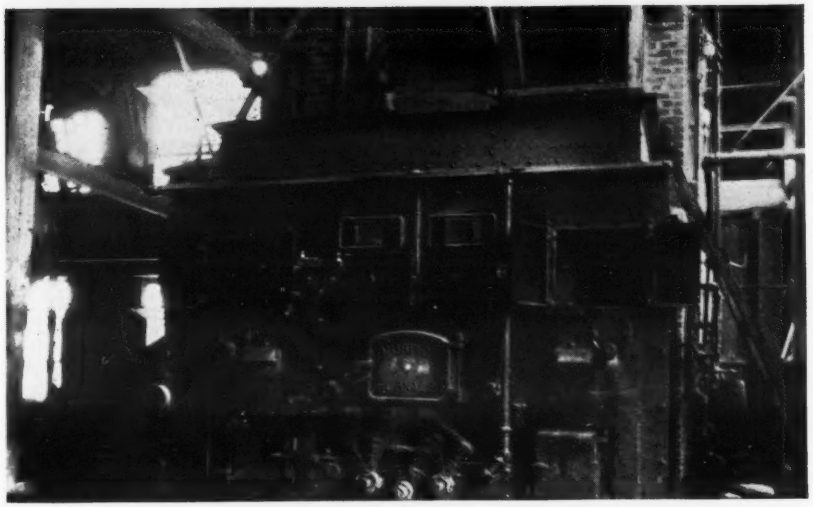


Producer-gas regulator for controlling pressure and quality of gas



Gas producer showing overhead coal bin and feed equipped with productimeter

Boiler feed, coal from same overhead bin that supplies gas producers



Boiler equipped with mechanical stoker

Battery of kilns discharging to pan conveyor

Packing room showing the barrel elevator and runways

Packing room showing bin foundation and bulk-loading facilities

flue gas with standard gas sampling and analyzing equipment show whether or not all the gas is being burned, and how much excess air there is, if any.

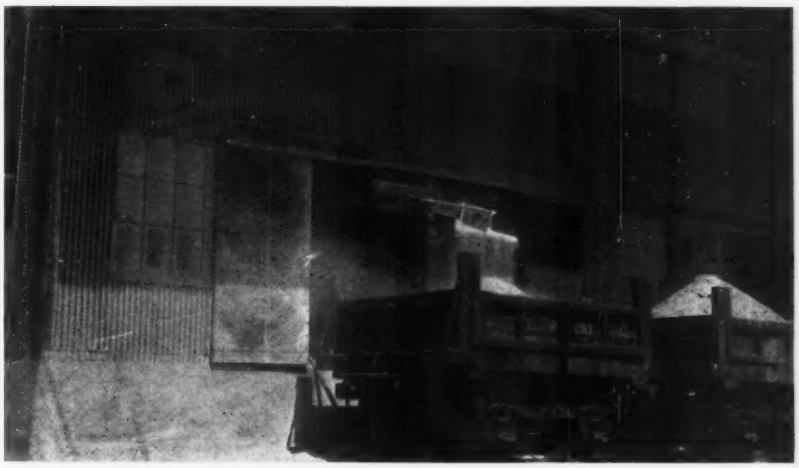
Draft gages for measuring the suction, or draft, are inserted both in the air inlet at the discharge tables of the kilns and at the point where the draft or exhaust flue leaves the kilns. The draft in the exhaust flues is shown on an indicator mounted in the same case with the pyrometer which registers the temperature of the flue gases.

The lime itself is regularly analyzed not only to determine its saleable qualities but to get the effect of different kiln-operating conditions.

Tempering the Flame

While a producer-gas flame is generally recognized as being a better heat medium to make lime than that from a coal fire direct, there are of course all kinds of producer gas, depending on the amount of impurities it contains. In the case of these kilns, using highly preheated air for combustion, it was found easy to get too intense a fire for best results. For uniform continuous operation of these kilns there must be a lining that is not only highly refractory but must also keep smooth. Experience so far would indicate that silica brick is the most desirable. (In the Mount kiln, it will be remembered, the combustion takes place inside the kiln proper.)

However, various experiments are being tried in tempering, softening or "mellowing" the flame that are likely to lead to very valuable results for the whole lime industry. One method, but a wasteful one, is to make poor producer gas. Both Mr. Wood and Mr. Mount object to inefficient operation of the gas producers to obtain this effect and Mr. Wood is therefore trying out the possibilities of introducing steam and also flue gas into the kiln at the gas ports, and at the same time with good rich producer gas.



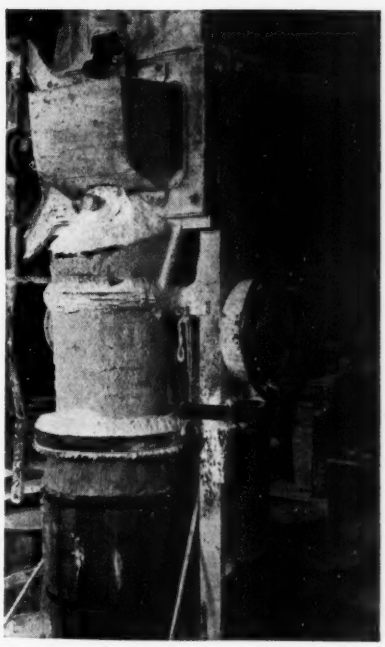
Loading out bulk lime for the hydrating plant

Operating Economy

Notwithstanding the problems here outlined, it is believed that these kilns already hold a record for operating economy. The few men required to operate the kilns has already been referred to. Their fuel ratio, when visited by the writer in May, was nearly 6 tons of lime per ton of coal, including the coal burned under the boiler, which too often is omitted by lime-plant operators in quoting fuel ratios. The coal is accurately recorded by a "productimeter" or automatic counter on the gas-producer feed and by measured amounts fed to the boiler. The producer consumes approximately 22 tons per day and the boiler 3. Running all six kilns on 25 tons of coal, as has been done, makes 150 tons of lime. With proper sized stone from the crusher and with the installation of larger fans Mr. Wood predicts even a higher fuel ratio.

The coal used at Rockland is a good grade of West Virginia gas coal averaging about 13,400 b.t.u. (This figures out about 2234 b.t.u. per lb. of lime.)

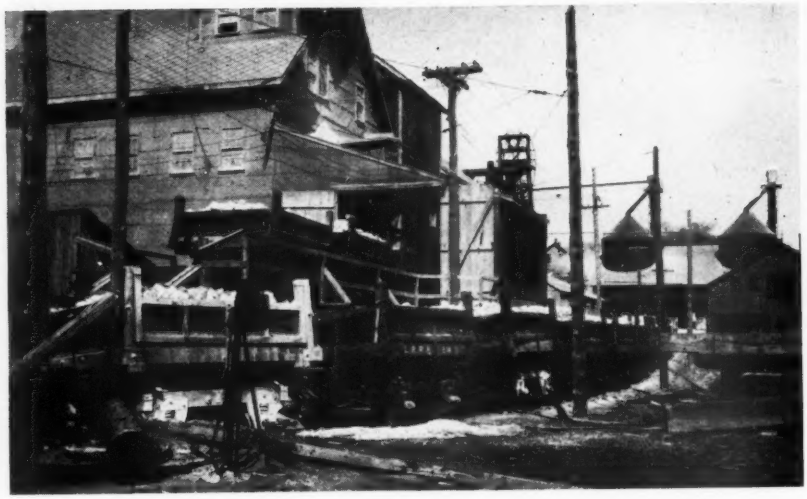
The lime as drawn is so cold as to



Loading lime in paper lined barrels by automatic weighing barrel filler

Dumping level of skips

Top of packing plant showing elevators for lime



Lime on the cars dumping into crusher pit at hydrating plant

hardly give any sensation of warmth when held in the hand. The flue-gas temperature, where it leaves the kiln, is about 250 deg. C. The water for cooling the gas valves is used for the boiler feed. There is no waste heat except what goes out the flues and the heat radiated from the kilns. This latter is probably considerable but may be lessened later on by the use of an insulating medium. However, except for this, probably few men would want to work in the plant through a Maine winter.

Conclusions

As will be gathered from the foregoing, laboratory control of the Rockland plant is not yet entirely perfected. Still enough has been done to show the possibilities with such equipment as the Rockland plant already has. Indeed, looked at in a large way, this whole plant is a huge laboratory for the lime industry in which the effect of various factors in kiln operation on the finished product may be scientifically studied for the first time in the history of the lime industry. This is so because in no other plant that the writer can recall are so many of these variable factors known or are so capable of control at will. With this end in view Mr. Wood, Mr. Mount and the Glamorgan Pipe and Foundry Co. are co-operating.

Construction Records Broken

ANOTHER record-breaking month of construction is reported by the F. W. Dodge Co. All previous records were broken in April; May building contracts passed the April total with a margin of 3 per cent. The May total for the 27 Northeastern States was $362,590,000, which was 50 per cent greater than the figure for the corresponding month of last year.

These two record months have brought the volume of construction started from January 1 to June 1 up to $1,352,965,000, the highest recorded figure for the first five months of any year. The year to date is 61 per cent ahead of last year. The revival has now become general. Very large increases were recorded in the Central Western States, which heretofore have lagged behind the East. Residential building contracts broke all previous records in May, amounting to $140,932,000, or 39 per cent of the month's total. During the first five months of this year the amount of residential construction started has been double that of the corresponding period of last year.

Other important items in the May total were: $63,817,000, or 18 per cent, for public works and utilities; $57,515,000, or 16 per cent, for business buildings; $32,925,000, or 9 per cent, for educational buildings, and $23,893,000, or 7 per cent, for industrial plants. Contemplated new work reported during the month amounted to $519,414,000.

National Slate Association Meeting

WHILE the officers and directors of the National Slate Association from as many districts as are represented now in membership were selected at the meeting of slate producers at the Commodore, Philadelphia, on June 13, it was decided by the newly elected board of directors that, unless the industry as a whole was ready to go into the association and make it worth while, little should be done at the start.

To this end a special committee consisting of Messrs. Fletcher and Bowles and Secretary Hays were named to assist the board of directors either by personal calls or by letters to secure the membership of the other producers.

The following officers were elected: District 3, E. R. Norton; district 4, F. C. Sheldon; district 5, H. H. Shinville; district 6, W. H. Smith; district 7, N. M. Male; district 8, James Owens. This leaves districts 1, Canada; 9, Hard Vein; 10, Peach Botton and Maryland; 11, Virginia, Georgia and other Southern states, and 12, Western district, vacant.

It is hoped that producers in these districts will immediately become members and select their directors so that the complete board of directors can be made up and the association permanently organized.

At the present time, it is believed that more than 60 per cent of the country's slate production is represented in the association, and the committee expects to increase the membership to 85 per cent at the least.

Atlantic City Meeting of Portland Cement Association

A REGULAR meeting of the Portland Cement Association will be held at the Hotel Traymore, Atlantic City, N. J., on June 27 and 28.

On the 27th the following papers will be presented: "Steel and Iron and Their Application to the Cement Industry," by W. R. Shimer, sales metallurgist of the Bethlehem Steel Co.; "Quality Control in Cement Manufacture," by Richard K. Meade, consulting engineer, Baltimore.

On the 28th the regular business session of the association will be held.

Department of Agriculture to Study Effect of Organic Matter in Concrete

SANDS unsuitable for concrete on account of the presence of loam or other organic matter are to be investigated by the Bureau of Public Roads and methods of treatment devised to make them safe for use. Until recent years it often happened that concrete made of good cement and well-graded and apparently good sand would disintegrate and become worthless. In such cases the poor quality has been attributed to all the different things which go to make a poor concrete.

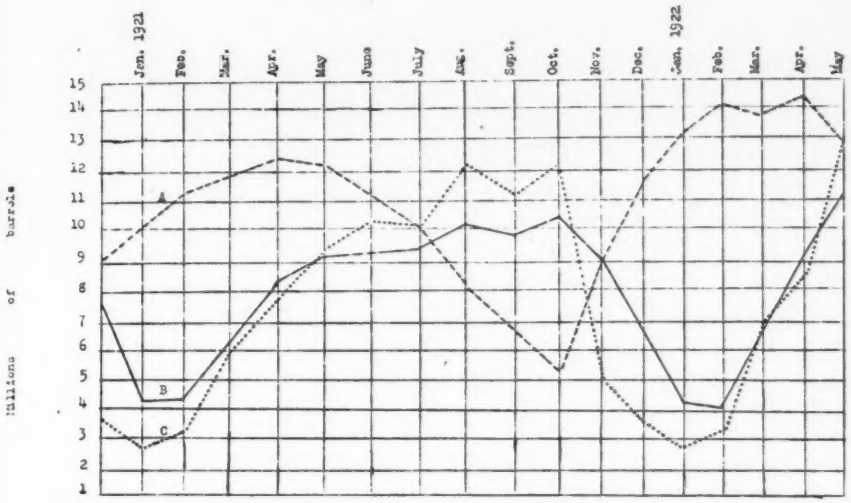
A few years ago laboratory workers discovered the effect of organic matter in sand and devised a simple test to determine its presence in harmful quantities. The Bureau now hopes to find methods of treatment so that such sands can be used. Samples of sand from all parts of the country are desired and anyone is invited to send in a sample in which the presence of organic matter is suspected, addressed to the Bureau of Public Roads, Washington, D. C.

Cement Output in May

THE statistics shown in the accompanying table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for May were made necessary by the lack of returns from three producers.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in April amounted to 10,855 bbl., valued at $26,134. The total imports in 1921 amounted to 122,317 bbl., valued at $388,828. The imports in April were: From Canada, 10,024 bbl.; Japan, 713 bbl.; other countries, 118 bbl. The imports were received in Porto Rico, 10,121 bbl.; Hawaii, 713 bbl.; San Francisco, 16 bbl.; Vermont, 3 bbl., and Philadelphia, 2 bbl.

The exports of hydraulic cement in April were 75,412 bbl., valued at $216,073; of this total 74,441 bbl., valued at $212,946, was portland cement, which was sent to Cuba, 37,649 bbl.; the other West Indies, 4482 bbl.; South America, 16,886 bbl.; Central America, 623 bbl.; Mexico, 4883 bbl.; Canada, 2878 bbl.; other countries, 1430 bbl. The total exports of hydraulic cement in 1921 were 1,181,014 bbl., valued at $4,276,986.



Monthly fluctuations in production, shipments, and stocks of finished portland cement

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN MAY, 1922, AND PRECEDING MONTHS

Month—	Production (Barrels) 1921	1922	Shipments (Barrels) 1921	1922	Stocks at End of Month (Barrels) 1921	1922
January	4,098,000	4,291,000*	2,539,000	2,931,000*	10,300,000	13,316,000*
February	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	14,142,000*
March	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	13,848,000*
First quarter	15,240,000	15,254,000	12,091,000	13,218,000		
April	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	14,470,000*
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	12,897,000
June	9,296,000		10,577,000		11,150,000	
Second quarter	27,228,000		27,984,000			
July	9,568,000		10,301,000		10,414,000	
August	10,244,000		12,340,000		8,280,000	
September	10,027,000		11,329,000		6,953,000	
Third quarter	29,839,000		33,970,000			
October	10,506,000		12,114,000		5,348,000	
November	8,921,000		5,195,000		9,091,000	
December	6,559,000		3,697,000		11,938,000	
Fourth quarter	25,986,000		21,006,000			
	98,293,000		95,051,000			

*Revised.

(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories.

A. P. Sandles and C. L. Clark in Limelight

A. P. SANDLES, who had intended entering as a Democratic nominee for Governor of Ohio, has been ruled out of the fight because of his failure to sign a declaration of candidacy, according to the Cleveland *Plain-Dealer*. Secretary of State H. C. Smith, who rendered the decision, said:

"In my opinion these powers cannot be delegated. I would like to find a way to permit the name of A. P. Sandles to appear upon the ballot, but I am unable to do so. The protest is sustained and the name of A. P. Sandles will not appear."

Whether or not the case will be appealed to the Supreme court is uncertain. Attorney L. J. Johnson, representing Sandles, left Columbus immediately after the hearing ended. It was stated at Sandles' office that his intentions were unknown.

Sandles' declaration was filed by his secretary, C. L. Clark. Clark's attention was called to the fact that the document was unsigned, and he immediately left the Secretary of State's office and sought a notary, in whose presence he signed the declaration and swore to it.

The notary, not knowing Sandles, was under the impression it was Sandles who was signing the declaration and taking the oath.

The question was raised when it was learned that Sandles had left for a trip through British Columbia.

Then a protest was filed with the Secretary of State by Attorney E. J. Greeley, Columbus. The hearing on that protest was held June 17 before the Secretary of State.

Sandles was a candidate for the governorship nomination in 1914 against former Gov. James M. Cox. At the primary he received 35,971 votes, against 135,583 for Cox. A third candidate, J. C. Martin, unknown in politics, polled 16,789 votes.

Sandles was secretary to the old Board of Agriculture under former Gov. Judson Harmon.

Greeley, who filed the protest against the Sandles candidacy, declined today to say whom he represents. Secrecy had been enjoined upon him by his client, he declared.

The taxation fight, however, and the road building program advocated by Sandles for years seem interwoven in the fight to keep him off the ballot.

Complain of Rate Discrimination

THE Lyman-Richey Sand Co., of Omaha, has complained to the Interstate Commerce Commission of discrimination in rates between Iowa and Nebraska as a result of recent reduction in intrastate rates in Iowa by the board of railroad commissioners of that state. The average reduction asked is 17 per cent.

The delegates attendant upon the fourth annual meeting of the National

Lime Progress Through Research

A convention full of practical help to producers brings out the value to the lime industry of the research work that has been so well carried on, and indicates a need for still further investigation

THE fourth annual convention of the National Lime Association, which was the 20th annual meeting of American lime manufacturers, was the best convention ever held. It was full of inspiration, and at the same time almost every minute brought out facts of real practical value to the lime producer. It is significant that the convention reflected the growing tendency to realize the importance of technical investigation and research work in the promotion of the lime industry. The convention was held in Cleveland, Ohio, and not least in importance in the memories of those who attended was the hospitality shown by the Ohio men who acted as hosts at the frolic Thursday afternoon and evening.

About 100 producers were present, and in addition there were a number of visitors interested in one way or another in lime. The papers presented were all of high quality and in nearly every case the discussion following the papers was lively and brought out many points of interest and value.

The officers, with the exception of the treasurer, were re-elected. Charles Warner, president of the Charles Warner Co. and of the American Lime and Stone Co., is president and George G. Nicholson, president of the White Marble Lime Co., is vice-president for the coming year. W. R. Phillips, who recently became secretary-manager of the association, of course, continues in this position, and Milton McDermott, of the Knoxville Sand & Lime Co., was elected treasurer of the association. The directors remain practically the same as during the past year. (The directors are elected by their district associations.) One or two changes will probably be announced as soon as confirmations have been received.

The convention opened on Wednesday morning with a paper on the new Rockland-Rockport Co. lime plant, by Nathan C. Rockwood, of ROCK PRODUCTS, who described how some of the wrinkles have been ironed out of this remarkable new plant. The paper was illustrated by a number of lantern slides showing various features of the plant, and was followed by an interesting discussion of many lime-plant operating problems.

An extemporaneous address on lime burning in rotary kilns by Irving Warner, general manager of the American Lime & Stone Co., started a general discussion of rotary kilns, which seem to be arousing more and more interest.

A short address by Hon. Newton D. Baker, former Secretary of War, during the afternoon created a great deal of enthusiasm. Mr. Baker showed unexpected familiarity with agricultural lime, and brought to the convention food for serious thought on the proper functions of trade associations.

Lime in the Chemical Industries

The convention was particularly strong on the subject of the chemical uses of lime. The first paper on chemical lime was presented by P. A. Paulson, consulting engineer in the paper industry of Appleton, Wis., on the subject of lime in the sulphite pulp industry. Mr. Paulson outlined the theory and some of the practice of the sulphite process, and included in his paper a number of interesting facts about the lime used in the process. He said in part:

"One of the most important fundamental principles of the sulphite process is the proportion of the lime in cooking acid to the wood or rather to the lignin in the wood. What is known as the end point in the cooking process is determined by the amount of lime left in the liquor; that is, when the lime is all used up the cooking must be discontinued even if it is not completed. On the other hand, if too much lime is left in the liquor when the cooking is completed, small particles of mono-sulphite will adhere to the fibers, making it difficult to screen and bleach and finally shows up as dirt in the finished paper.

"The character of the lime used is also of great importance. Although all the bi-sulphites act in general in the same way, the character of the cooking acid is modified in several very important particulars, according as one base or another is in combination with the acid. Bi-sulphite of calcium is a very unstable salt which decomposes very easily when heated, forming calcium mono-sulphite and free sulphur dioxide. The mono-sulphite is practically insoluble so that when the decomposition occurs in the digester this salt is precipitated throughout the pulp and is very difficult to remove. When straight calcium lime is used the resulting pulp is harsh, hard and transparent and it is more difficult to

Lime Association, held at Cleveland, Ohio, on June 14 to 16, 1922

make a straight calcium acid of high test than it is to prepare similar liquor from a magnesium line.

"Bi-sulphite of magnesium is more stable than the corresponding calcium salt and there is therefore a more gradual liberation of sulphur dioxide in the cooking process when an acid with a high magnesia content is used. This allows a higher temperature and the bringing of the cooking process to a much finer end point without injury to the fiber. It results in more uniformly cooked pulp, easier to bleach and thus eliminating the waste of a larger amount of wood in the form of screenings; in other words, higher yield. In a recent investigation, it was found that a number of mills using the straight calcium lime were making as high as 8 per cent of screenings as compared with from 2 to 3 per cent where the high magnesium lime was used. The action of the magnesium bisulphite on the incrusting matter is milder, but even more effective. The sulphates or monosulphites which may remain in the magnesium liquor remain in solution and are easily washed out, and there is no doubt but that the pulp resulting from cooking with high magnesium liquor is much softer, whiter, and more pliable than that resulting from pure calcium bi-sulphite liquor.

"Following is the analysis of some limes extensively used:

	Massachusetts	Ohio	New Brunswick	Wisconsin
Calcium oxide CaO	56.02	58.61	55.96	54.67
Magnesium oxide MgO	40.10	40.25	37.98	43.21
Alumina and Ferric oxide Al_2O_3 and Fe_2O_3	0.57	0.12	1.23	0.55
Sulphur trioxide SO_3	0.11	0.15	0.16	.....
Insoluble in HCl, sand, etc.	0.94	0.07	1.51	0.52
Silica soluble in acid SiO_2	0.47	0.15	1.81	.....
Loss on ignition H_2O, CO_2, etc.	1.43	0.51	1.00	0.32
	99.64	99.86	99.65	99.27

"Everything seems to indicate that the best lime for use in the sulphite pulp industry is that which contains a high per cent of magnesia. It is important that the lime shall be as free as possible from iron and other impurities and that it should be well burned. Air slaked lime should also be avoided since the moisture is likely to vary and it would be difficult to maintain a uniform proportion of base in the acid.

Lime for Glass Making

A concise and very helpful paper on lime for glass making was presented by R. R. Shiveley, of the Monongah Glass Co. Mr. Shiveley is a consultant glass chemist and fellow of the Mellon Institute of Pittsburgh.

All three forms of lime are used in glass making, and each has its supporters who believe that good glass cannot be made from any other form of lime. Certain manufacturers will not use a lime containing 3 per cent of magnesia, while others prefer a dolomitic lime with 35 or 40 per cent of magnesia present.

Limestone has many advantages over other forms of lime. The most important ones are low cost, constant composition, and is less objectionable to handle. The chief objection to limestone is that it requires more heat to melt a limestone batch than batches of quick lime and hydrated lime. From a thermo-chemical standpoint this is true, and practical experience has verified the thermo-chemical data. Quicklime is preferred by many, because of it being less difficult to melt, and because it is practically free from organic matter. It is objected to because of its being unstable, unpleasant to handle and expensive. Hydrated lime is used but little, but is recommended by some because of the benefit said to be derived from the expulsion of water in the melting process. However, it is unstable, expensive, and harder to melt than quick lime.

In giving specifications for lime products for glass making, there is a wide variation in the requirements of different factories. This is caused by the size of the tank furnace, by the quality of glass being made, and by the kind of glass being made. Where window glass is made, coarse limestone is usually preferred, and the iron content may be as high as 0.8 per cent, while with tableware a finely ground product is preferred, with not more than 0.2 per cent of iron. Accordingly each factory should find its requirements, and these should be adhered to very closely.

The specifications given by Mr. Shiveley varied but little, he said, from those recently published in Bureau of Standards Bulletin No. 188. The adoption of these specifications should go a long way toward helping the glass manufacturer and also the lime manufacturer to know what is expected of him. Mr. Shiveley is of the opinion that 90 per cent of the troubles attributed to the lime and glass-making materials are due to something else.

Lime in Soda and Sulphate Pulp

The use of lime in soda and sulphate pulp manufacture was discussed by G. K. Spence, chief chemist of the New York and Pennsylvania Paper Co. He explained the use of quicklime in accomplishing the conversion of sodium carbonate into caustic soda and the sodium sulphate into sodium sulphide in the two processes. He explained the two processes and gave a very helpful account of how lime manufacturers can help the paper maker and incidentally improve their own market.

It was customary formerly to receive the lime in bulk form in carload lots, and for years the pulp manufacturer took what the lime producer sent him and made the best of it.

Conditions have changed during the

past few years. At many mills every car of lime is tested for active CaO content before it is used. Should a car fall below a certain specified guarantee in this respect, the lime is either rejected or used with the understanding that claim be allowed for the difference in CaO content and also for loss of soda due to excessive amount of sludge discharged from the pan.

The impurities usually present in lime are silica, oxides of iron and aluminum, magnesium oxide, calcium sulphate and calcium carbonate. As far as causticizing is concerned, these impurities, with the exception of silica, exert no influence whatever, being simply present as so much ballast. An excessive amount of silica present, especially when the lime is over-burned, very much reduces the active CaO content of the lime, due to fusion of the silicates which encloses some of the calcium oxide and prevents the slaking water from reaching it.

Magnesium oxide is objectionable on account of its poor settling quality when present in caustic liquor, and its percentage is limited in specifications for whiting, should the lime sludge be reclaimed for this purpose.

Lime for causticizing purposes should contain about 90 per cent active calcium oxide, and not over 1¼ per cent magnesium oxide, or 1½ per cent silica when received at the mill.

By an occasional get-together meeting of the pulp manufacturer and the lime company furnishing his requirement of quicklime, a great many difficulties can be overcome and lime can be often selected so that it will better meet the conditions involved.

The lime producer can be of assistance to the manufacturer if he can regulate the burning of the lime so that when the silica is a little higher than usual the lime is not over-burned, for if it can be handled in this way the efficiency of the lime can be considerably increased. Some lime producers today are grinding burned lime and furnishing it to the mills in granulated form.

Lime in Water Softening

S. C. Hadden, editor of *Municipal and County Engineering,* pointed out the growing sentiment in favor of centralizing water-softening plants, and gave many of the advantages of soft water, as he had heard them expressed by leading municipal engineers. He pointed out the opportunity both for public service and for greatly increased business for lime producers, if this sentiment for centralized softening plants could be spread among all the communities of the United States. "It is my opinion that an intensive educational and promotional campaign, directed from the central office of the National Lime Association, utilizing all the effective agencies that can be brought into play would greatly expedite the installation of central softening plants with profit to the public and to the lime and other industries."

Mr. Hadden pointed out some of the fundamental principles in carrying on such a campaign, and by a little calculation, showed that the conservative estimate of the annual tonnage of lime required in water softening for the entire country is over a million tons, as compared with 30,000 tons now used for that purpose.

Lime in Textile Industry

Dr. E. R. Darling, textile specialist, pointed out that there are two main divisions in the uses of lime in the textile industry. The first of these divisions is the one in which the largest tonnage of lime is required, and includes the lime boil, softening of water for dyeing, and recausticizing of waste caustic liquors. The second class includes the processes which require only a small tonnage such as liming kiers, dyeing, preparation of chemic, scouring of wool.

Dr. Darling pointed out that the introduction of lime into the textile industry on a large scale has been more or less hampered by tradition, lack of technical knowledge regarding its use, and the active work of large alkali manufacturers.

There seems to be little uniformity of opinion on the specifications of a lime for the textile industry. Magnesia oxide is looked upon as dangerous and should not be present, except in very small amounts. Iron oxide has been shown by research not to produce the effects that the average bleacher is led to believe it does, although the amount present should not be high. The same is true of silica. Dr. Darling said: "After much experience with lime, I consider a product that is uniform is color, not lumpy, and very active chemically with a calcium oxide content of at least 90 per cent, with less than 2.5 per cent of magnesium, 3 per cent of silica and 2 per cent of iron and aluminum oxides well suited for lime boils. Lime used in dyeing should contain less than 1 per cent of iron oxide. It is better to employ hydrated lime for this purpose and the same is also true of the scouring operation."

Some of the advantages of lime over stronger alkalies are that it is cheaper and safer to handle; it reduces the number of uneven boils to a minimum; complete circulation is less important with lime than with caustic soda, lime gives the cloth a better bottom, lime makes it possible to effect a complete removal of the wax from the cloth; treatment with lime requires only half the time of caustic soda when the pressure kier is used; it is highly efficient in removing proteid matter; and its action is mild compared with the harsh action of the stronger alkalies.

Research is necessary to clear up the many problems which are involved in the lime boil, dyeing, and so forth. This work must not only be of a laboratory nature but should include large scale research through putting men into the textile plants to study under plant conditions and develop practical data. This will involve field work and Dr. Darling recommends that such work be taken up by the National Lime Association.

Work of Chemical Department of Lime Association

Dr. M. E. Holmes, manager of the chemical department of the association, in his report, pointed out that a wider use of lime depends on a fuller knowledge of the utility of lime, rather than on salesmanship, so-called. The promotion of the knowledge of the uses of lime involves two distinct and separate activities; obtaining the information back of the use of lime, and putting that information across to the user. In other words, these two main divisions are research and investigational work on the one hand and publicity work on the other.

The association has received samples of the products from most members of the association, and a study of the fundamental properties of these lines is being carried on. Most of the research and investigational work is being done in the central office of the association, and at the Indiana and Ohio State Universities.

At Ohio University, Prof. Withrow has four men working half time on the problem of burning various typical limestones under various conditions of time and temperature to determine the extent to which the property of the lime, particularly for the chemical uses, can be altered by modifying the conditions of the burning.

At Indiana University Prof. Mathers and two of his advanced students are working upon various problems bearing upon specific uses of lime, including plasticity of lime for mortar, lime as a dehydrating agent, the reaction between lime and hard water, the manufacturing of polishing compound, the rate of slaking, the complete hydration of lime the settling of lime, and whiting substitutes. Results so far have been very encouraging.

The publicity work of the department has been planned along broad lines to include the publication of results in technical journals, the preparation of lectures to be delivered before technical and industrial societies, correspondence, and bulletins.

Slaking and Settling of Lime

The interesting experiments carried on by Prof. F. C. Mathers of the University of Indiana, showed that hy-

drate may be made to settle more rapidly by slaking the quicklime with water, containing from 0.5 to 1 per cent of calcium chloride. Other materials may be used, but probably the calcium chloride is the cheapest. A slow settling lime is made by slaking the quicklime with a 0.5 to 1 per cent sugar solution. Lime slaked with excessive water to a wet hydrate settles slowest of all. The presence of chemicals in the excess of water used in making a wet hydrate had little effect upon the settling. Hydrates ground in a pebble mill settle slower than the unground hydrates.

The rapidity of slaking can be increased or decreased by the addition of suitable chemicals to the water. Compared with pure water for slaking, the following solutions gave the results indicated when quicklime from marble was treated with an equal weight of the liquids at room temperature: 1 percent hydrochloric acid, 1/12th as long; 5 per cent hydrochloric acid 1/35th as long; 1 per cent barium chloride 1½ times as long; 5 per cent alcohol 2½ times as long; 1 per cent creasol, 5 times as long; and 0.5 per cent sugar 15 times as long.

Hydrated lime may be reburned or changed back to quicklime by heating to 840 deg. F. (450 deg. C). This quick lime, or reburned lime, is very fine and exceedingly active especially towards water. It instantly slakes with cold water, and the solutions which retarded the slaking of ordinary quicklime had no apparent action on this active reburned lime.

The reburned lime will instantly combine with the water in 95 per cent alcohol. Experiments have shown starting with a percentage of alcohol of 93.5, original quicklime will produce a percentage of 95.96 at the end of the first day, while the reburned quicklime produces a percentage of alcohol of 99.44 at the end of the same length of time. With the original commercial quicklime, 10 days were required to give an equally strong commercially anhydrous alcohol. These results were arrived at when twice the quantity of lime required for combining with the water in the alcohol was added.

No very noticeable effect upon the plasticity of high calcium limes was produced by: slaking the quicklime with different chemical solutions and under different conditions of temperature; slaking in water vapor or steam at various temperatures; partial slaking as above with the rest of the slaking in the ordinary way; partial carbonation followed by slaking in the ordinary way.

Hydrates slaked with water, with sugar solution, and with water vapor (air slaked), have apparent densities which decrease in the order named.

Justification of Research Work

Dr. E. R. Weidlein, director of research of the Mellon Institute, pointed out that scientific methods furnish the most effective means thus far developed for the advancement of physical and chemical technology, and that accordingly, scientific investigation is an essential economic adjunct to industrial enterprises. He cited many cases where scientific research has saved thousands and millions of dollars annually to the world in resulting improved processes of production in many different fields, and he pointed out that research work is only successful when conducted by an amalgamation of related industrial interests. Dr. Weidlein was strongly in favor of free interchange of information and the co-operative research and investigational work to be carried on by all the members of an industry. He paid the chemical department of the National Lime Association a high compliment for the research work it had already accomplished.

O. B. Towne, secretary of the Waxed Paper Manufacturers' Association, showed the present-day need of the trade association in a paper delivered before the convention.

Dr. Oliver Bowles, Mineral Technologist, U. S. Bureau of Mines, outlined briefly the work of this bureau, especially telling about the study of quarry conditions and operations which the bureau has undertaken. Mr. Bowles plans to visit within the next year a large number of quarries for the purpose of studying their methods of operation and he will prepare a report which will emphasize the best operating methods of all the quarries he has visited. Quarry operators can aid greatly in this work by answering freely all requests for information which the bureau may put to them, and the more help the individual operators give, the greater will be the benefit to the industry.

Lime in Construction

Warren E. Emley, in charge of lime investigations at the U. S. Bureau of Standards, gave a very valuable talk on the results of some experiments which have been made on the effect of lime in concrete. Real, tangible proof of an increase in the workability of concrete with no loss of strength has been established, a fact of much commercial importance to the lime industry. Prof. H. C. Berry of the University of Pennsylvania, described some experiments in the use of lime in concrete, as they have been carried on at the University of Pennsylvania.

Lime in Agriculture

Prof. W. C. O'Kane, of New Hampshire College, delivered a comprehensive paper on the subject of lime in crop protection. He traced the uses of lime from the earliest known times when lime was put on the soil without any scientific knowledge of its preparation or any real knowledge of its true value, through to the most modern methods of lime application. He pointed out the need for lime where it is deficient, even in many areas where the soil is underlaid with limestone. Many uses of lime are known to be helpful in agriculture, but a great deal of careful and painstaking experimentation needs to be carried on to secure the real facts, and Prof. O'Kane believes there is a field for inquiry here in which the association should take an active part. Lime is known to have been effective in preventing root rot of corn, in preventing club root of cabbage, in rendering less destructive the disease known as onion smut, in protecting melons and cucumbers from attacks by the striped cucumber beetle, and in preventing or rendering less harmful many other vegetable and plant diseases.

J. A. Slipher, manager of the Agricultural Department of the association, delivered a paper on some new angles on the use of lime in agriculture.

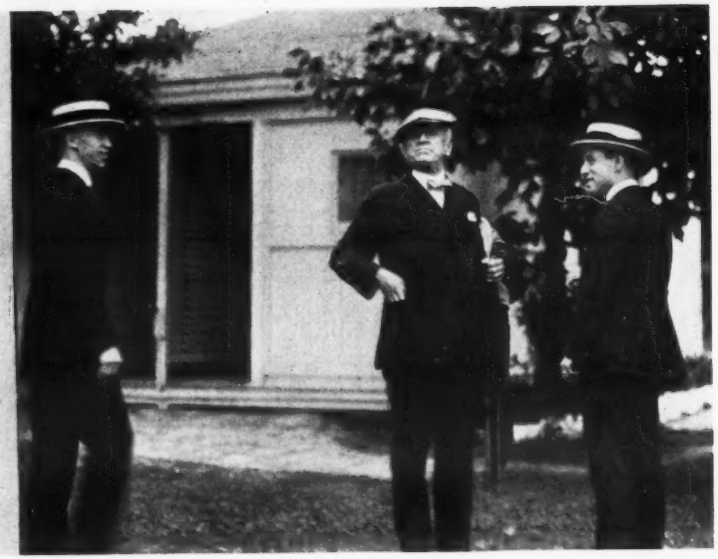
Entertainment Features

The association officers followed their usual custom of having daily luncheons, free for all, which served to keep the members together during a social hour.

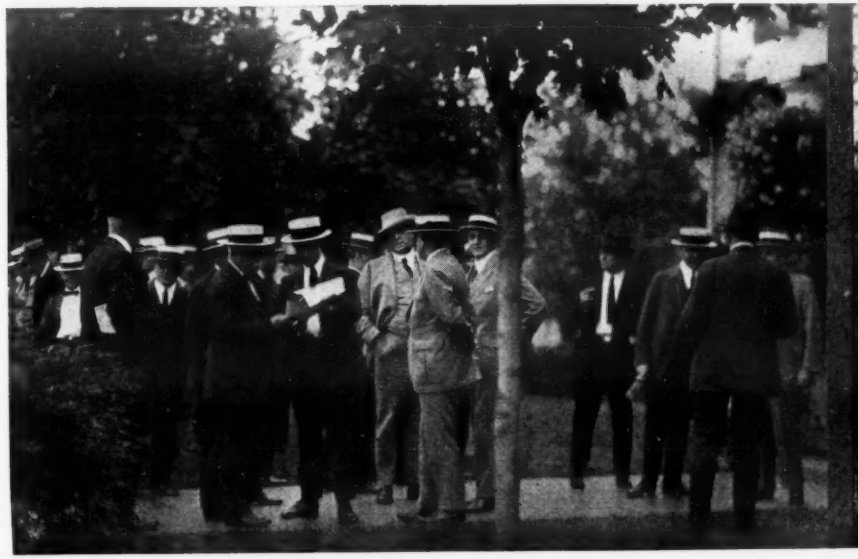
Additional entertainment was provided by the local members of the association and the Valve Bag Co. of America in the form of a "house party" at the Black Whale Inn, 22 miles west of Cleveland on Lake Erie, where refreshments of various kinds were very much enjoyed, followed by a "regular" vaudeville performance.

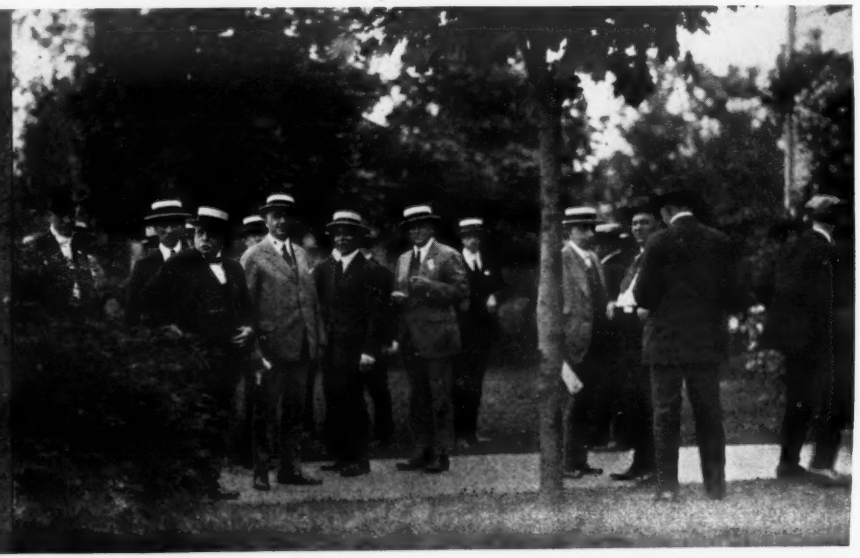
THE REGISTRATION

George N. Muntain, president and secretary, Stark Grey Lime Co., Canton, Ohio.
R. R. Smith, Climax Lime and Stone Co., Wick, Pa.
Henry Angel, Kelley Island Lime and Transport Co., Cleveland, Ohio.
Prof. H. C. Berry, University of Pennsylvania, Philadelphia, Pa.
R. S. Bizzell, superintendent, Filtration Plant, Flint, Mich.
Oliver Bowles, Bureau of Mines.
Charles A. Breskin, "Rock Products," Chicago, Ill.
T. E. Beebe, C. E., Lakeside, Ohio.
R. C. Brown, Oshkosh, Wis.
E. G. Baker, Ohio Hydrate and Supply Co., Woodville, Ohio.
Charles C. Bye, Charles Warner Co., Wilmington, Del.
H. G. Bridgewater, Longview Lime Works, Longview, Ala.
W. B. Berry, Kelley Island Lime and Transport Co., Hillsdale, Mich.
H. L. Brickell, National Lime Association, Washington, D. C.
R. P. Brown, Western Lime and Stone Co., Oshkosh, Wis.
Paul Bowers, Luckey Lime and Supply Co., Luckey, Ohio.
(Miss) Dr. J. D. Carpentar, Allwood Lime Co., Manitowoc, Wis.
William Comstock, Kelley Island Lime and Transport Co., Cleveland, Ohio.
John H. Chiles, Austin White-Lime Co., Austin, Tex.
H. C. Cawley, Tomkins Bros., Newark, N. J.
W. E. Carson, Riverton Lime Co., Riverton, Va.
O. Z. Cook, Lehigh Lime Co., Mitchell, Ind.
Clinton S. Darling, Editor, Rock Products, Chicago.
Elton R. Darling, Professor of Chemistry, James Milliken University, Decatur, Ill.
C. O. Dowdell, Central District Manager, National Lime Association, Quincy, Ill.
Milton A. McDermott, Knoxville Sand & Lime Co., Knoxville, Tenn.
H. Dittlinger, Dittlinger Lime Co., New Braunfels, Tex.
E. B. Entwisle, vice-president and treasurer, Limestone Products Corp., New York, N. Y.



YOUR FRIENDS, AND OURS, AT THE BLACK WHALE INN, JUST BEFORE THE BIG EATS! NOT A CARE IN THE WORLD—AT THIS MINUTE. TOMORROW IT WILL BE BACK TO THE LIME KILN.





William B. Eastwood, "Cement, Mill and Quarry," Chicago.
William Leon Ellerbeck, vice-president and manager, The Utah Lime and Stone Co., Salt Lake City, Utah.
Warren E. Emley, Bureau of Standards, Washington, D. C.
G. H. Faist, Woodville Lime Products Co., Toledo, Ohio.
J. L. Faist, Woodville Lime Products Co., Toledo, Ohio.
E. O. Fippin, National Lime Association, Washington, D. C.
William Flaherty, Hoosac Valley Lime Co., Inc., Adams, Mass.
J. J. Fitzgerald, "Pit and Quarry," Chicago.
A. C. Freeborn, Vermarco Lime Co., West Rutland, Vt.
W. E. Gardner, Security Cement and Lime Co., Hagerstown, Md.
D. M. Gilbert, Emig Lime Co., Hellam, Pa.
H. A. Gawthrop, Merion Lime and Stone Co., Norristown, Pa.
W. R. Hoback, Gager Lime and Mfg. Co., Sherwood, Tenn.
W. E. Healey, Rockland-Rockport Lime Corp., Boston, Mass.
Earl C. Harsh, Cleveland, Ohio.
M. E. Holmes, National Lime Association, Washington, D. C.
H. F. Herrod, Kelley Island Lime and Transport Co., Canton, Ohio.
C. R. Jackson, Utica Lime Co., Seymour, Ind.
D. F. Jennings, "Concrete," Detroit, Mich.
F. A. Jones, Pittsburgh Plate Glass Co., Zanesville, Ohio.
N. H. Justice, Kelley Island Lime and Transport Co., Cincinnati, Ohio.
W. L. Kinsting, Luckey Lime and Supply Co., Woodville, Ohio.
W. A. Kibbe, National Lime Association, Washington, D. C.
C. H. Kammann, Ste. Genevieve Lime Co., St. Louis, Mo.
M. P. Kenny, Gager Lime Mfg. Co., Sherwood, Tenn.
J. W. Langdon, Kelley Island Lime and Transport Co., Kelley Island, Ohio.
V. H. Lanier, sales manager, Commercial Lime Co., Jacksonville, Fla.
E. M. Lamkin, Kelley Island Lime and Transport Co., Cleveland, Ohio.
G. R. LeGore, LeGore Lime Co., LeGore, Md.
O. H. List, Kelley Island Lime and Transport Co., Cleveland, Ohio.
Leopold Lardesk, president, Limestone Products Corp., New York City.
J. H. McNamara, Eagle Rock Lime Co., Eagle Rock, Va.
T. J. McGrath, Kelley Island Lime and Transport Co., Chicago.
J. W. McBarney, Technical Engineer, Cleveland Board of Education, Cleveland, Ohio.
J. King McLanahan, American Lime and Stone Co., Hollidaysburg, Pa.
Bernard L. McNulty, Lehigh Lime Co., Chicago.
Warner Moore, Moore Lime Co., and Powhatan Lime Co., Richmond, Va.
H. B. Mathews, Jr., Mississippi Lime Co., Alton, Ill.
Miss E. J. Munsell, National Lime Association, Washington, D. C.
A. B. Mack, Kelley Island Lime and Transport Co., Cleveland, Ohio.
E. H. Milner, Mississippi Lime and Material Co., Alton, Ill.
F. C. Mathers, Indiana University, Bloomington, Ind.
F. G. Nicholson, White Marble Lime Co., Manistique, Mich.
K. E. Nicholson, White Marble Lime Co., Manistique, Mich
Harvey S. Owen, Northwestern Bureau, National Lime Association, Oshkosh, Wis.
J. F. Potts, Kelley Island Lime and Transport Co., Cleveland, Ohio.
W. R. Phillips, Kelley Island Lime and Transport Co., Cleveland, Ohio.
Jules Petrequin, Ste. Genevieve Lime Co., Ste. Genevieve, Mo.
K. F. Pinnegar, Kelley Island Lime and Transport Co., Detroit, Mich.
F. M. Pinnegar, Kelley Island Lime and Transport Co., Cleveland, Ohio.
P. A. Paulson, Paper Mill Engineer, Appleton, Wis.
E C. Porter, Vermarco Lime Co., Albany, N. Y.
J. B. Rusk, Kelley Island Lime and Transport Co., Indianapolis, Ind.
Nathan C. Rockwood, "Rock Products," Chicago, Ill.
T. B. Shertzer, Eastern District Engineer, New York City.
Edward C. Swessinger, Western Manager, Kelley Island Lime and Transport Co., Cleveland, Ohio.
H. R. Smith, Climax Lime and Stone Co., Wick, Pa.
George K. Spence, Chief Chemist, New York and Pennsylvania Paper Co., Johnsonburg, Pa.
R. R. Shiveley, Monongah Glass Co., Fairmont W. Va.
W. S. Steele, Kelley Island Lime and Transport Co., Rochester, N. Y.
W. O. Scholtz, president, Western Lime Co., Denver, Colo.
Asa M. Smith, Woodville Lime Products Co., Toledo, Ohio.
S. W. Stauffer, J. E. Baker Co., York, Pa.
Arthur F. Smith, Woodville Lime Products Co., Toledo, Ohio.
E. W. Savage, Kelley Island Lime and Transport Co., Cleveland, Ohio.
W. J. Stewart, Marblehead Lime Co., Kansas City, Kans.
J. W. Stockett, Research Specialist, National Lime Association, with Bureau of Standards.
Miss M. E. Squire, Allwood Lime Co., Manitowoc, Wis.
J. W. Tilley, John Herzog & Son, Forest, Ohio.
J. J. Urschel, The Woodville Lime Products Co., Toledo, Ohio.
G. C. Urschel, The Woodville Lime Products Co., Toledo, Ohio.
H. L. Vernia, Hoosier Lime Co., Salem, Ind.
F. J. Wertel, National Mortar and Supply Co., Gibsonburg, Ohio.
G. B. Wood, Rockland-Rockport Lime Co., Rockland, Maine.
Irving Warner, American Lime and Stone Co., Bellefonte, Pa.
Fred Witmer, Ohio Hydrate and Supply Co., Woodville, Ohio.
Charles Warner, Charles Warner Co., Wilmington, Del.
Alan G. Wikoff, "Chemical and Metallurgical Engineering," Chicago.
B. B. Williams, Marblehead Lime Co., Kansas City, Mo.
F. W. Zorn, National Mortar and Supply Co., Gibsonburg, Ohio.
Maxwell Brill, Thwing Instrument Co., Philadelphia, Pa.
Drame Burns, The Harshaw Fuller and Goodwin, Elyria, Ohio.
H. H. Clifford, Hadfield-Penfield Steel Co., Bucyrus, Ohio.
J. H. Forsyth, National Lamp Works, General Electric Co., Cleveland, Ohio.
R. S. Fetter, D. H. Stoll Co., Buffalo, N. Y.
E. V. Gilbert, Kramer Bros. Foundry Co., Dayton, Ohio.
H. M. Hallett, Pennsylvania Crusher Co., Pittsburgh, Pa.
C. C. Kritzer, Kritzer Co., Chicago.
M. B. Mount, Glamorgan Pipe and Foundry Co., Lynchburg, Va.
H. E. Nauss, Stacy & Wilton Co., Wrightsville, Pa.
H. D. Pratt, Link-Belt Co., Philadelphia, Pa.
J. C. Schaffer, Schaffer Engineering and Equipment Co., Pittsburgh, Pa.

Echoes of the Convention

WARREN EMLEY will be the representative of the Bureau of Standards at the World's Centennial Exposition at Rio de Janiero, Brazil. He will leave this country with his family in August, and will be gone the better part of a year. Unfortunately, the United States Government is the only exhibitor from this country at the fair.

J. W. STOCKETT, research fellow of the National Lime Association at the Bureau of Standards, has developed a quick-setting lime plaster, the ingredients of which are all lime products. This new product bids fair to revolutionize the plaster industry—maybe a lime-plaster board is coming!

T. B. SHERTZER, Eastern district engineer of the National Lime Association at New York, according to rumors has devised a lime kiln that will increase the capacity and efficiency of the ordinary commercial kiln by something like 1000 per cent (?).

WILLIAM E. CARSON, president of the Riverton Lime Co., is putting out lime in 10 and 25 lb. bags distributed through wholesale grocers. This is not particularly profitable from the tonnage point of view, according to Mr. Carson, but it is worth a great deal through the resulting publicity for lime.

THE TWO LADIES from Wisconsin, producers of lime, contributed a great deal, not only to the social features of the convention, but some sound, practical business suggestions. Miss Squire proposes that the lime industry should graded; this is the only way, in her opinion, that producers of both high and low quality limes can be sure of fair treatment at all times. Miss Squire is probably the first woman to apply her chemical and geological knowledge to the lime industry; she has been doing for 10 years what is now proposed by a few large producers of today.

JAMES H. MCNAMARA of Eagle Rock, Va., and his "tin" barrel were well received, not the less because he announced that he had no stock to sell in his new idea. Lime producers are free to copy his idea without royalties. Mr. McNamara is one of the old "war horses" of the lime industry.

DR. W. L. ELLERBECK, president of the Nephi Plaster Co., and vice-president and manager of the Utah Lime and Stone Co., both of Salt Lake City, and a well-known chemist and specialist in the rock products industries, was at a National Lime Association convention for the first time.

ANOTHER Western producer who made his first appearance at a lime convention is W. D. Scholtz, president of the Western Lime Co. of Denver, Colo., a new producer.

A NEW member, attending his first lime convention, was Virgil H. Lanier, sales manager of the Commercial Lime Co. of Jacksonville, Fla. He is also secretary of the Florida Soft Phosphate Association.

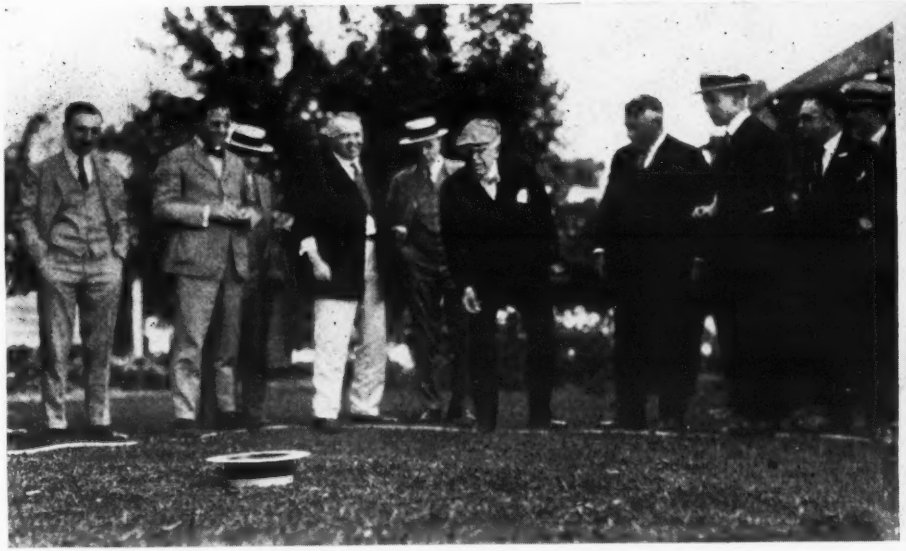
A TANGIBLE result of the Research Department of the National Lime Association is seen in the recent conversion of one of the country's largest cities to the use of the lime-soda-ash process of water softening.

A MUCH missed member of the association was A. H. Lauman, president of the National Mortar and Supply Co., Pittsburgh, Pa. Mr. Lauman was the treasurer of the association. The recent death of his son, A. H. Lauman, Jr., has caused Mr. Lauman to take a less active interest in his business affairs.

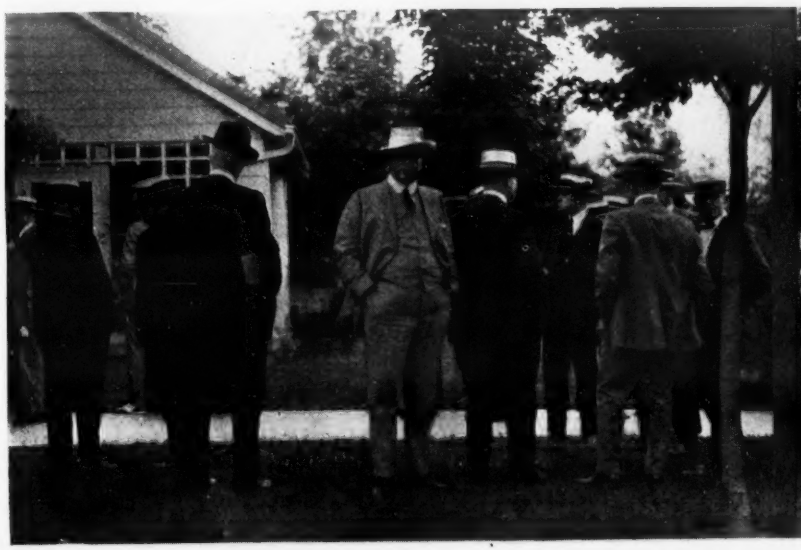
ANOTHER regular member of long standing who was missed by his many friends was J. E. Pollock, secretary and treasurer of the Ash Grove Lime and Portland Cement Co. Pressing business elsewhere prevented his attendance.

CONSTRUCTION on the addition to the hydrate plant of the Ohio Hydrate and Supply Co. at Woodville, Ohio, is well under way.

H. F. HERROD recently sold 50 carloads of agricultural lime for a single shipment. The order will be shipped from Marblehead to Canton, Ohio, in one train. This is the biggest single shipment ever recorded



WHETHER THEY "GET IN THE HAT"—TALK SERIOUSLY OVER THE AFFAIRS OF THE INDUSTRY—TURN THEIR MODEST BACKS ON THE CAMERA MAN—GET SET FOR THE TUG OF WAR, THESE MEN ARE ENJOYING EVERY MOMENT OF THE FIELD SPORTS



by the Kelley Island Lime and Transport Co., and Mr. Herrod is hoping to duplicate the feat more than once during the season. He looks for a good year in agricultural lime.

THE MARION, Ohio, plant of the Kelley Island Lime and Transport Co. has just been reopened after a long shut-down.

THE CENTRAL Bureau of the National Lime Association is opening a district office at 51 Mercantile building, Quincy, Ill. C. O. Dowdell will be in charge. For the past year his office has changed with his travels.

THE MISSISSIPPI LIME AND MATERIAL CO. of Alton, Ill., is making extensive improvements at its Hannibal, Mo., plant.

THE CENTRAL WEST Fuel Co. of Menominee, Wis., is building two lime plants, each having a 50-ton capacity. The rock for this plant will be brought over in barges from the plant of the Michigan Limestone & Chemical Co. at Rogers City, Mich. The plant is being designed and built by P. J. Callinan, and will be in operation by the middle of July, 1922.

HARVEY OWENS of the Northwest Bureau of the National Lime Association reports that lime plaster is coming back very strong in Michigan, Wisconsin, and Minnesota. Mr. Owens has been giving technical talks at the meetings of the Wisconsin Chapter of the American Institute of Architects.

THE TALKS following the luncheon on each of the three days formed a remarkably interesting feature of the convention. Hon. Newton D. Baker, former Secretary of War, was born in a limestone country in West Virginia, and he could talk fluently on the subject of lime. H. Elmo Martin filled his hearers with inspiration on how to handle the day's work, and George A. Coulton, vice-president of the Union Trust Co. of Cleveland, delivered a very comprehensive talk on business conditions. Mr. Coulton was an optimist whose optimism was based on established facts in the business world of today rather than on economic theory.

An Experience in Applying Chemical Knowledge

How a woman has built a successful lime business, as told to the National Lime Association convention by

Miss Mary E. Squire

President and General Manager of the Allwood Lime Co., Manitowoc, Wis.

WHEN I left home (Wisconsin) I came here to ask a thousand whys. I know so little about the lime business. I received a map showing 626 uses and I wanted to know could every plant furnish all those uses; if not, why not? I wanted to know the physical appearance of each stone and the chemical contents and the fuel with which it could be best and most economically burned, and the kind of kiln in which it was best to produce it, and also, last but not least, the kind of container in which it could be most economically and efficiently sent, and the price

Miss Mary E. Squire of the Allwood Lime Co.

of that container — above all, the price. Could the container be a returnable one, and so give a salvage to the consumer, and would the railroad folks accept it?

All of these whys I wanted to know, and when I came and saw and heard about the great Rockland plant, I thought there is a great majestic ocean liner explained, and you are the little 30-ft. launch; now go home and keep quiet.

But, gentlemen, what I have learned about my own stone was a case of necessity. I soon found that I could not compete with any Wisconsin competitor in anything except quality, because you all know that the amount of lime each one of us produces in 24 hours regulates and controls the cost for us. I have a little 50-ton a day capacity plant; not worth talking about. But I found I had a quality of lime similar to that which for 200 years we had to import from Germany and pay them, laid down on the dock in Hoboken, from $80 to $200 a ton. And immediately I started to find out which particular stone was that in my plant. And I made 240 tests. And it took me the better part of four years before I finally caught the rascal and identified him every time and could teach the common Italian who he was and gave him an artificial name.

Then I found out that I had him. I made him. But I didn't make him in the form in which the consumer, if you please, wanted him. That was an additional investigation, and I made 20 additional tests at a cost to our company of $3500 cash to find out what machinery was needed.

A large machinery concern in the East sold me an outfit that their agent guaranteed. And when I set it up and started it at 4 o'clock one afternoon, I had to shut it

Dr. J. D. Carpenter of the Allwood Lime Co.

down in 20 minutes, and at 11 o'clock the next day the plates inside were so hot I couldn't touch them without burning my fingers.

This company sent me a telegram, one word—"Impossible." I replied, "So possible, gentlemen, that I have instructed my attorney to commence a damage suit for $3750 on your guarantee." Suffice it to say, they took back that outfit and they expressed me an outfit that weighed 2700 lbs. "rush express" to avoid the losses. It

was one that I picked out, and it did the work.

This (indicating piece of lime) is the victim, a specimen of lime drawn from my kiln on January 7, 1918, kept in an ordinary wide-mouthed, open-mouthed bottle, and exposed to all atmospheric conditions every day and night since. Fifty per cent of the solution of my problem was due to chemical analysis and geological identification of the stone; and 50 per cent to the burning and ascertaining that certain fuels, or rather let me say, certain sap in the wood fuels will utterly destroy the qualities desired.

I went to New York with my lime. And the largest and oldest firms in the metal polishing business said to me, "Why, Miss Squire, we can't experiment with your Vienna lime. Do you know that $50 worth of that lime goes into $250 worth of product, and if it doesn't go in it, we have to throw the oils into the sewer. We can't stand such experimentation."

I said, "Well, if we gave a bond to guarantee that the $50 worth will go in not once but every time, will you try it?"

"Well, it isn't likely. We can't afford it."

In December, 1915, every pound of German imported lime was used up in this country. Then they began to ask for me. I sent samples. One very clever gentleman in Newark with his partner came all the way West and found me and said, "We have come to make a contract with you." He beat me down to the lowest possible price. When I got his contract he said, "Now I am going to tell you something, Miss Squire. We had some of the German lime left, and we made 32 tests of the Allwood, and we found that 31 tests of the Allwood were better than the German, and on the other it fell down. Now, I didn't tell you this until I got your contract."

Gentlemen, suffice it to say that the Allwood Lime Co. has supplied the entire United States, Canada and England with steel ball finishing lime. The last two-thousandths of an inch is cut or burnt or eaten off with this particular lime. It has to eat even every particle as you can readily understand, to insure plasticity. What would our ball-bearing cannons be without it? I don't know. I didn't stop to think. How could we have finished our surgical instruments? For every surface and polish on all methods is produced on lime cake. And yet the United States only needs 1500 tons a year.

One funny little incident. I had been corresponding with some lime people in England, and not 10 miles from Manchester where I was sending this thing, I could have gone over and made the stuff. I felt like saying, "Why don't you get your chemist busy?" Now, the one thing that has induced me to tell you this little bit of a personal experience is this: My company and myself and four other women associates would have lost the savings of their life by going in the lime business to make building lime. We saved our business and we have a profitable small concern; and because I happen to have chemical and geological knowledge which I applied to this, I merely ended the trail. I hope above all things if I never come here again, that this association will realize that the very foundation stones of our business are the chemists, the men who can tell you that is the thing and that isn't.

I have not belonged to this association only the first year, because I didn't need a set of expert salesmen to go out and sell my product. As soon as you make the best material for any specific use, the man comes to your door for it; but it must honestly be the best; it can't be a bag of wind that a glib salesman can put across with smooth talking and low practices.

Kelley Island Elects New Officers

JAMES A. KLING was elected chairman of the Board of the Kelley Island Lime & Transport Co. at the first meeting of directors on June 17.

George R. Johnson of Buffalo, who has been vice-president of the Foundation Co. in charge of its central district for 14 years, was elected president.

F. W. Ohlemacher, who was elected fourth vice-president, has been in charge of the company's vessels and Sandusky department for many years. Following is a list of officers and the executive committee:

Chairman of the board, John A. Kling; president, George R. Johnson; first vice-president, E. W. Oglebay; second vice-president, F. A. Beckwith; third vice-president and general manager, G. J. Whelan; fourth vice-president, F. W. Ohlemacher; secretary and treasurer, C. A. McMorris; assistant general manager, A. B. Mack; assistant secretary and assistant treasurer, F. W. Kuhl; auditor, J. W. Longdon.

Executive committee: John A. Kling, chairman; George R. Johnson, H. M. Hanna, Jr., John Sherwin, John E. Morley and H. G. Dalton.

Cement on Tariff Free List

CEMENT has been placed on the free list, after considerable acrimonious discussion in the Senate at Washington on June 3. It has been put on this list along with common brick. The imports will pay duties equal to those charged by other countries.

Originally cement was taxed 25 cents a hundred pounds. The Canadian rates are 11 cents a hundred. The Republican and Democratic members staged a battle over the old issue of Canadian reciprocity and the restoration of cement to the free list, in which many sharp things were said on both sides. It is said, declared Senator Underwood, that Canada will now be glad to enter into a new pact.

Carmichael Gravel Co. to Move Office to Danville

THE Carmichael Gravel Co., Williamsport, Ind., will soon move its offices to Danville, Ill. The company has been located in Williamsport ever since it was organized. Railroad accommodations and the fact that much of the business is now in Illinois are the reasons given for this move.

E. Guy Sutton, vice-president of the company, has moved his family to Danville, and Fred Steinberg, who has been managing the Williamsport office, will also go to Danville.

Magnesite Production in 1921

REPORTS received by the United States Geological Survey, from producers of magnesite show that the quantity of crude magnesite sold or treated during 1921 was 47,904 short tons, valued at the mines at $510,177. This quantity was less than half that for 1920, and smaller than that for any year since 1916. California was the only producing state, and nearly all the product was calcined for use as plastic material. The output of domestic magnesite for use in refractory products was very small.

In contrast to the large decrease in domestic production there was an increase in imports, which consisted chiefly of crude magnesite. The apparent consumption of magnesite in the United States in 1921 was equivalent to about 113,500 short tons of crude magnesite, 58 per cent of which was imported. This consumption is the lowest recorded for many years, probably largely because of conditions in the metallurgic industries, which consume, in the form of refractory material, most of the magnesite used.

Investigating Whitewashes and Aqueous Lime Paints

A PAPER on the "Investigation of Whitewashes and Aqueous Lime Paints" was presented by G. J. Fink, of the Research Laboratory, National Lime Association, Washington, D. C., before the Division of Industrial and Engineering Chemistry, at the 63d meeting of the American Chemical Society, held in Birmingham, Ala., April 23 to 27, 1922.

The paper, with illustrations, has been reprinted in the June, 1922, issue of the *Journal of Industrial and Engineering Chemistry*, and without doubt the National Lime Association has copies of the paper available.

The Pacific Coast Magnesites

California and Washington have sufficient reserves of this important non-metallic mineral of proper quality to supply our industries for centuries. The author's 30 years' experience in this field gives him ample authority to tell of magnesite's value, its production, its future

By W. P. Bartlett
Superintendent of the Tulare Mining Company

IN AMERICA the form of magnesia carbonate known as magnesite has two important and several minor uses. It is found in both crystalline and amorphous forms, bearing no resemblance one to the other.

The crystalline is in various colors, resembling limestone or dolomite. When dead-burned with or containing iron, it is practically refractory, and is used as a lining in basic steel frunaces. Absorbing the phosphorus from the molten iron, the steel produced is never "cold-short" and may be safely used in the tallest sky-scraper or the largest ship.

In its amorphous form, magnesite is white, breaks smoothly in any direction, and when calcined is used chiefly in the manufacture of Sorel cement. Ground to 100 mesh or finer, the calcined magnesite receives a filler of silica, feldspar, marble dust, and wood fiber, and the mass is made plastic with magnesian chloride. When placed on walls, floors, or the exterior of buildings, this putty gives a hard, polished surface, non-expanding and non-cracking, in any desired color, and of a very pleasing appearance. Sorel cement has proved so satisfactory that its use is growing with great rapidity, and when properly applied, practically doubling each year. As magnesite composes but about 15 per cent of the mass its cost is not much more than that of inferior cements.

Development in California

Magnesite exists in America only on the Pacific coast. Prior to 1915, the California product was used principally in the manufacture of paper, this use beginning in 1891 and ending in 1917. Between these years there were minor uses, two of which have developed elsewhere into great industries. It lined the basic furnaces that produced the steel from which were built the battleship "Oregon" and Admiral Dewey's flagship at Manila bay. It was used successfully as a pipe-covering and for Sorel cement; and in its raw state, reduced by sulphuric acid, to epsom salts. But we never could attain the Eastern market.

From 1891—when I began mining and calcining magnesite in Chiles valley, Napa county—until 1915, the annual production for uses on a crude ore basis did not much exceed 5000 tons, and we were practically the only producers. The rapidly growing Eastern demand was supplied by importations from Austria of the crystalline dead-burned for refractory use, and from Greece for plastics. Three large Eastern concerns were making magnesite brick, and one of them had a plant in Austria. The Sorel cement business was increasing rapidly.

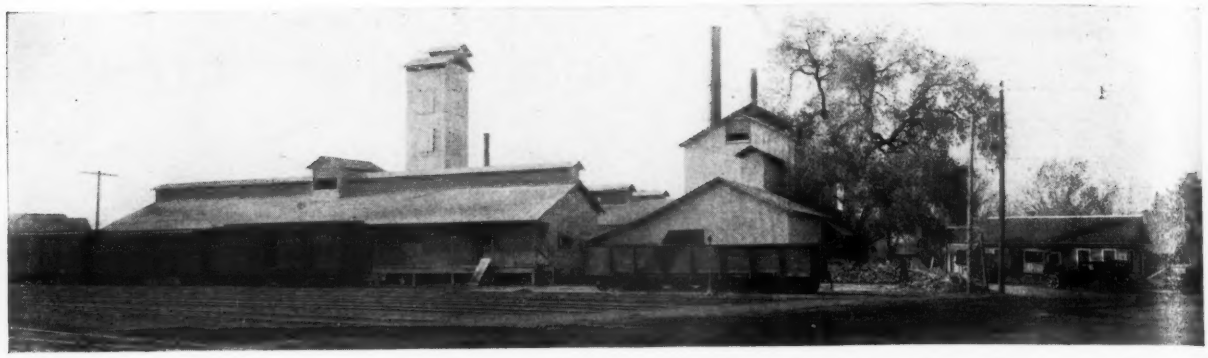
South Tule magnesite mines, near Porterville, Calif., a well developed property. It has several miles of tunnels and four miles of tram tracks, with chutes, from the mines to the plant

The first magnesite kiln in America. It was built by Mr. Bartlett in Chiles valley, Napa county, in 1891. Its daily capacity was 12 tons crude

The Pacific Coast Supplies America

When the World War stopped the importation of European magnesite California became the only source of supply.

From five kilns, only one being in use, the operating companies increased in a few months to 22, the kilns to 52, and a small army was tearing up magnesite croppings in eight counties of the state. All these kilns produced calcined material to their capacity, while raw ore was shipped from numerous points to Eastern refractories. From a production of 5000 tons of crude magnesite a year, California in 1917 shipped east 215,000 tons. Practically all this magnesite, together with more than 100,000 tons from Washington, was used for refractory work, re-



This is the plant of the Sierra Magnesite Co., which is also located near Porterville

placing entirely the European, thus it was made possible for our government to get sufficient basic steel for the construction of ships and for the many other uses made necessary by the war. Without Pacific coast magnesite this country could not have built the ships that carried our armies and their necessities to France.

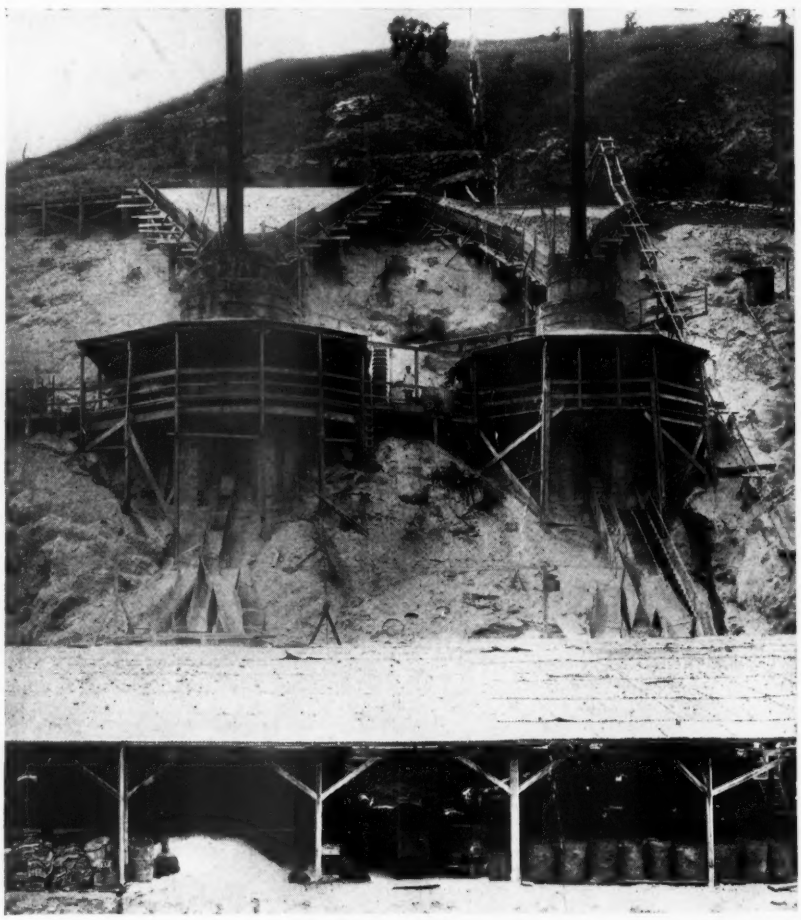
With no orders extending more than three months in advance, and even these orders subject to cancellation, California invested nearly $3,000,000, and Washington half as much more, in calcining plants, transportation facilities, and the opening of magnesite mines. It was not good business. Very little money was made, or could be made by the majority of the investors. Perhaps our country's needs may have helped to swell this amazing increase of production of an absolute necessity to national success. Most of us thought that Congress would give us a tariff that would make the industry permanent and their investments of future value.

By June, 1918, Washington's crystalline magnesite, reinforced with ground iron, was produced in sufficient quantity to supply all the refractory plants, and the California product was thereafter used mostly for the plastics. An epsom salt industry developed, with a great chemical use for the raw magnesite in the Middle West. This ended with the last increase of freight rates. The greater number of plants were now without business.

The Sorel cement industry, dormant during the war period, started up again, and it was believed California would supply the entire demand. But importations were resumed and the expected building up of a large business in California did not materialize. The output for 1920 was about 60,000 and the imports 50,000 tons. In 1921, our output was reduced 25 per cent. Washington's plants produced nothing, while imports made another large gain. Austria, Greece, South America and India took the business we lost.

A tariff of $15 a ton on calcined and $10 on crude had been passed by the lower house, and favorably reported by the Senate committee, in 1920; but got no further. The impending tariff bill contains these items. This protection, with the proposed freight reductions, would allow the Pacific coast to sell American magnesite in the American market without increasing the cost to the consumer. Otherwise, the investment made during the war would prove a complete loss, and a second call, were importations again interrupted, might fall upon deaf ears.

As was inevitable in suddenly constructed plants, the California product was not even in quality and some inferior magnesite was shipped. Since 1918, however, much has been done to standardize the product. A dependable market would solve the difficulty. Careful chemical control of all shipments, the



The oil-burning reverberatory shaft kilns at Magnesite. Their daily capacity is 90 tons crude, producing 40 tons calcined. The ore runs by gravity from the mines to the container. These kilns were built in 1908 and 1915 on plans of Mr. Bartlett

establishing of standard grades, and a system of quality control worked out by the Bureau of Standards have developed since that time.

From my examination of practically all the known magnesite deposits on the Pacific coast, extending over a period of thirty years—the reports on which I have—I believe that the production of 1917 could be carried on indefinitely and the present cost of mining and manufacture greatly reduced. Only two large plants, those at Chewelah, Wash., and Porterville, Calif., have direct railroad service. Of the districts of present and future greater production, that at Red Mountain, Santa Clara county is 34 miles; the Sampson district, in San Benito county, 47 miles; and the Pope Valley district, in Napa county, 29 miles from a railroad. Yet about two-thirds of the calcined production of the state in 1921 was from these districts. A certain market would bring in the railroads and greatly decrease the cost of production. Hasty construction gave kilns of various types, generally requiring unnecessary labor in their operation. Of the many plants, only one was operated by gravity from the mine to the container. With a permanent market these defects would be eliminated, with a still further lessening of cost production.

The tunnel dumps at Magnesite, showing the piles of crude ore

The cooling floor at the magnesite plant at Porterville

The California Magnesite Deposits

These magnesites are generally found in rough, mountain districts, usually high above canyon or valley, where chutes, cableways, crooked wagon roads or tram tracks are required to bring the ore to points of calcination. All the larger mines are so equipped, considerably above the present requirements. As the ledges in most districts are numerous, covering extensive areas, with each unit of comparatively small tonnage, the problem of assembling the ores quickly and cheaply, is often perplexing, usually requiring a separate solution on each property.

On the property east of Porterville, developed by the Tulare Mining Co., and recently sold to the Sierra Magnesite Co., of Chicago and San Francisco, the solution was three miles of 5½ per cent, grade 18-in. gage industrial tram track, served by six steel-lined chutes, set at 37 deg., from 200 to 400 feet in length. The ore moves in these chutes as it is removed from controlling self-closing doors below. By keeping the chutes full, there is little breaking of the ore or erosion of the lining. Bins above the kilns receive the ore, and gravity is the only power used. This property has been under constant development since 1908. It has been the policy of the management to keep reserves of from 50,000 to 75,000 tons of ore in sight. The ore is secured by tunnels and stopes, no hoisting from shafts being necessary. Two 50-h.p. electrically driven air-compressors serve the drills. The two cupola-reverberatory kilns are fed directly from the bins by gravity and the calcined product, drawn at a white heat, every 45 min., dropped into a cooling-chute, and thence into three 10-ton steel cooling bins, with 35-deg. bottoms. Crude oil, gravity-fed and atomized by steam, is the fuel. These kilns are so constructed that the hydrocarbon gases are entirely consumed. The air of combustion is heated to 1200 deg. F. The finishing heat of the reverberatory is 2300 deg. F. The capacity of these two kilns is 40 tons a day of standard calcined magnesite. During the war these kilns were operated continuously, except for very infrequent relinings, night and day 44 months.

The Harker property, near Porterville, under lease to the Sierra Magnesite Co., has been a large producer, and has many ledges on a long, high ridge not yet fully developed. Two electrically driven air compressors supply the drills.

The calcining plant of this company consists of two rotary kilns, 70 and 50 ft. in length, the capacity of the larger being 45 to 50 and of the smaller 25 to 30 tons of calcined magnesite per 24-hour day. The present production of the plant is 1400 tons per month. The ore comes from the Harker property by truck, and from Magnesite by rail. It is broken by two wheeler 18x15 crushers, and sized to ½-in. The material is then hoisted to

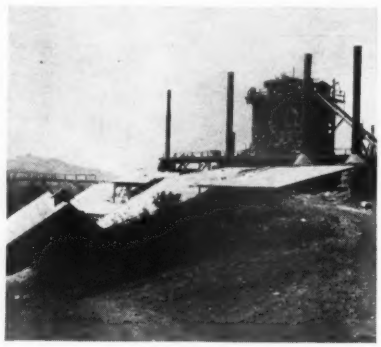
bins above the kilns. The calcining is done by low-controlled heat with the view of leaving any lime it may contain in its natural state. Crude oil atomized by steam is the fuel. The calcined product is carried by conveyors and dropped upon a long cement cooling floor. In a passage beneath this floor runs a screw conveyor which carries the cooled ore to a cross belt conveyor, which discharges into a Sturtevant rotary fine ore crusher. A chain elevator lifts the crushed ore to an 80-ton bunker above two six-unit banks of burr mills. At the end of each bank is a 5-ton sacking bunker. This pulverizing plant has a capacity of from 45 to 50 tons per 24-hour day. Of this product 98 per cent passes through a 100-mesh screen and 85 per cent through a 200 mesh. The Sierra Magnesite Co., is the only producer in California able to follow all the different steps necessary to ship from its plant a finished product for direct distribution to the manufacturers of Sorel cement throughout the country.

The Red Mountain Deposits

In Santa Clara county, 34 miles southeast of Livermore, the nearest railroad point, the deposits have been but partially developed, though three companies have calcining plants in the district. The leading and only producing mine at present, the Great Western, now under lease to C. S. Maltby, has a large development on one only of the many ledges on the property. These undeveloped veins undoubtedly carry large reserves equal in quality to the ore now being used. The ore is brought from the mine by two gravity-operated wire cableways to bins above the kilns. Two air compressors, driven by internal-combustion engines, supply the machine drills. The calcining plant consists of four shaft-type kilns, of the reverberatory order, and a Scott kiln for fines, all well housed with a combined capacity of about 60 tons of calcined magnesite per day. The product is cooled on a cement floor and hauled in bulk by trucks to Livermore, being shipped to Illinois for grinding, grading, and distribution. The ore calcines white, this being probably the largest body of white ore in the state. Crude oil atomized by steam is used for fuel. A system of heat control is used in the calcining operations.

The Sampson Group of Deposits

This group is 47 miles west of Mendota in the San Benito county section of the Coast Range, and owned by Moore Brothers, of Oakland, Calif. Only one of the group of three large croppings is now being worked, and this is unique in California magnesite deposits. The outcrop, or "blossom," consists of more than three acres of solid, nearly level magnesite, with no overburden, which has been opened on one side to a depth of nearly 100 ft. One can walk over this mass as on a pavement. Looking across a ravine to another cropping, nearly on a level and a mile away, a 50-ft. strip of vegetation differing from that flanking it gives promise of a ledge connecting the two. The ore is very pure, though when calcined it is somewhat dark in



This picture shows part of the five-kiln plant at the Maltby mine at Red Mountain, Santa Clara county

color. A gravity-driven cableway carries the ore in buckets down the mountain about a mile to a group of four shaft-type kilns of about 10 tons capacity each. The ore is cooled on a cement floor and hauled by truck to Mendota, the shipping-point. Crude oil atomized by air is the fuel. This property is near the survey line of a proposed railroad from Fresno to the coast and the route presents no physical difficulties. It would be useless to attempt to estimate the magnesite contents of these outcrops and the undeveloped ledges in this district.

Napa County Deposits

Of the many magnesite ledges that have been worked at times for the past 30 years, only one, the White Rock, in Pope valley, 20 miles from Rutherford, is now in operation. Like most of the Napa county magnesites, it runs high in iron, averaging about 4 per cent, and fills the refractory requirements of the coast. The deposit lies high up on the east wall of the valley, and the ore is brought to the seven small upright kilns on the valley floor by a mile-long steel cable. These kilns use coke mixed with the ore as fuel and have each a capacity of about four tons of calcined magnesite a day. The lease on the White Rock, with the plant, has recently been purchased by C. S. Maltby, the lessee of the Great Western. This mine has been a large producer in recent years.

Conclusion

To sum up: Magnesite is as important to our industries as iron or copper. California and Washington have sufficient reserves of a proper quality for centuries of use. They have, or would soon have, plants and transportation to supply all America. And its finished products would cost the consumer no more than those from imported magnesites. The use of the American product would put millions of dollars into circulation every year and guarantee us against a second cutting off of our supply.

Magnesite Hill, near Porterville. It is seamed by hundreds of magnesite veins. At present the deposits are only partially developed

International Cement Moves Up to 36¾

LAST week International Cement stock moved up nearly two points to 36¾, or within an eighth of its high for this year.

The interests identified with this company declare that its business has shown a remarkable improvement, and that if these earnings continue an increase in its dividend rate would be warranted.

A Plant Ahead of Its Time

A rotary kiln for dry or semi-wet burning, with a 175-ft. flame; a plant with remarkable flexibility to make every lime product; these and other features will make lime history at the American Lime and Stone Co.'s plant

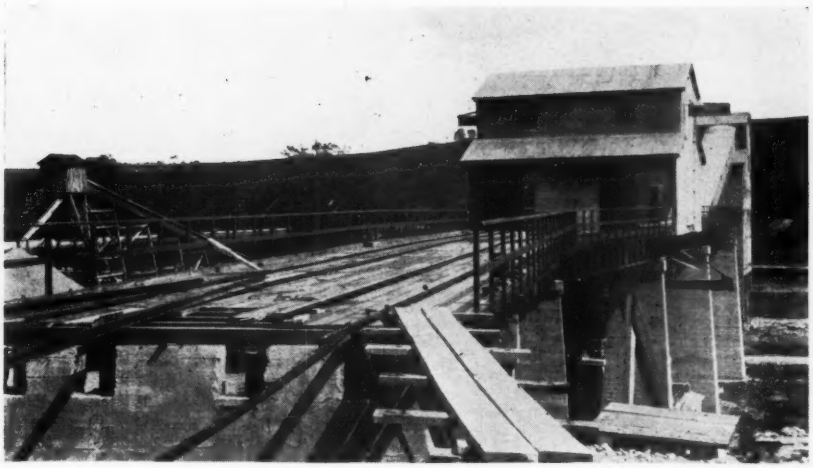
By Clinton S. Darling
Editor, Rock Products

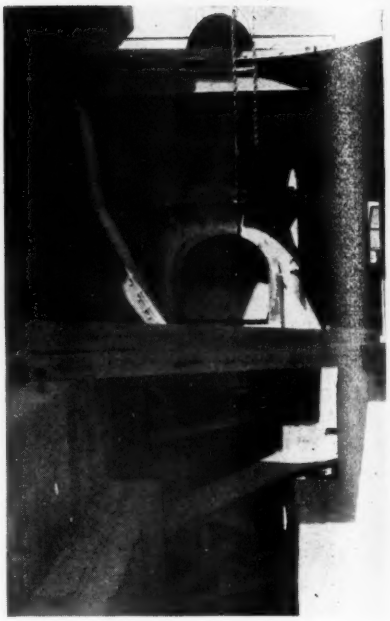
A PLANT to make any kind of lime product—a plant whose remarkable flexibility will permit practically its entire capacity to be devoted at a moment's notice to the production of any one of these products—a plant where material flows through from the raw state in the mine to the finished product in the freight car in as nearly as possible a straight line, with an unusually small amount of handling—in other words, a close approach to the ideally perfect plant. This is what the American Lime and Stone Company is preparing and expects to have in operation within the course of a few months. The hydrating, storage, and bagging plant has been in operation for a year in connection with some old shaft kilns; a modern crushing, screening, and stone storage plant is practically complete now; a rotary kiln is in place arranged to burn stone by the dry process or the new semi-wet process, by means of a new type of long-flame furnace; and spouts and conveyors of various kinds are arranged to conduct or by-pass material from one process to another so that any proportion of any material may be made with a minimum of travel.

Up to a year and a half ago the American Lime and Stone Co. were operating from 20 to 30 quarries and about 65 shaft kilns in and around Bellefonte, Tyrone, Union Furnace, and Hollidaysburg, Pa. At that time a new hydrating and bagging plant was completed and started in operation at Bellefonte using the shaft kiln lime, and work was well along on the new crushing, screening and rotary kiln plant. At the same time a mine shaft was sunk into the company's vein of good stone, and this shaft, recently completed and described in the last issue of Rock Products, will open a mine which will furnish a continuous supply of clean, uniform quality high calcium limestone. The hoist house of the mine is shown at the left in the illustration above.

From the headframe storage bins of the mine, stone will be transported about 200 ft. to the crushing plant, by belt conveyor to the screening plant and bins, and by addi-

Those largely responsible for the present plant are J. King McLanahan, Jr., at the left, secretary-treasurer for many years and now vice-president of the reorganized company, the three generations of Morrises, Elliott L., Charles A., and A. G., the latter president and now chairman of the board, and J. C. Schaffer, who designed the plant





tional conveyors in the ground limestone bins, into the rotary kiln direct, or into the tube mill for grinding either for agricultural limestone or for burning by the semi-wet process.

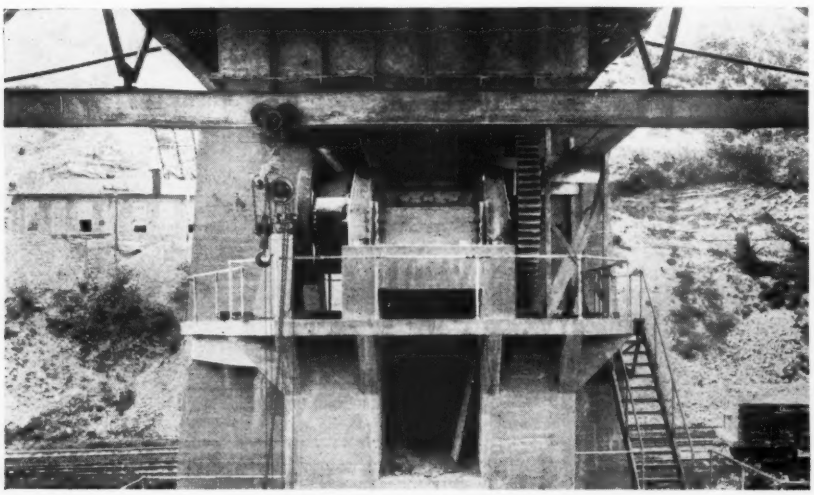
The burned lime can be shipped as lump lime, or ground and conveyed to ground lime storage tanks, or hydrated for chemical or other uses. The various conveyors and by-passes which give the plants its unusual flexibility will be described in the following detailed explanation of the plant.

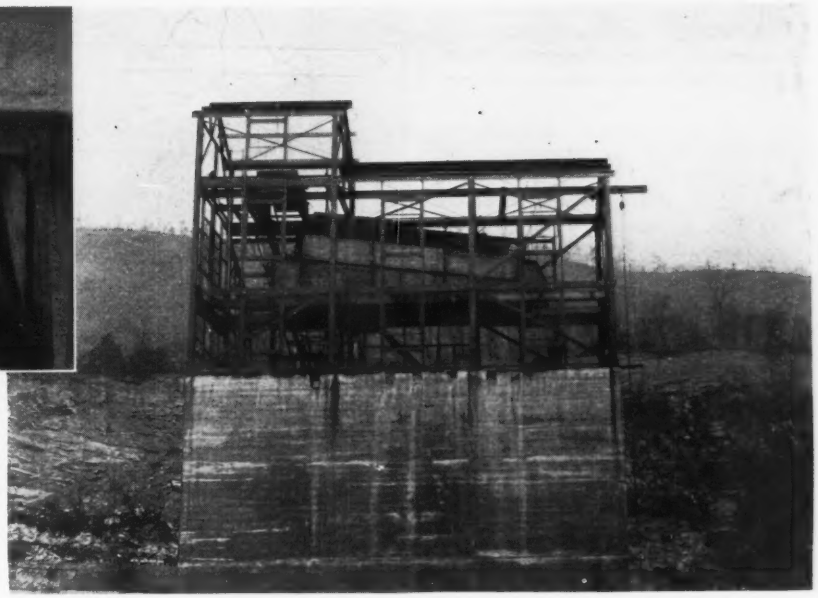
The Crushing Plant

Limestone from any of several of the company's quarries can be brought easily to the crushing plant by means of a 36-in. gage track connecting the quarries. A large part of the stone for burning in the rotary kiln, however, will come from the company's new mine. This mine, the shaft and cross-cuts of which have been completed, will take stone from a 77-ft. vein of "good stone" at four different levels, the lowest of which is about 375 ft. below the floor of the quarry in which the shaft was sunk.

The stone will be drawn from the mine headframe bins into side-dump cars by pneumatically operated bin gates, and transported over the trestle on either side on two 36-in. gage tracks which permit dumping into the stone box feeding the initial crusher, a 36x60-in. McLanahan stone single roll crusher. The illustration above shows the trestle and crushing house, with the tracks not yet connected with the quarry floor. A 250-hp. motor drives this crusher, using a 2200-volt current. The illustration at the left and the two below show the foundation for 60-in. McLanahan stone single roll crusher.

The stone passes for recrushing direct to a 7½ Gates gyratory crusher, shown above. The plant will have a second recrusher of the same size and type beside the first one, as the plan drawing on a later page shows. The illustration above shows at the top the circular opening provided for dumping the second recrusher. It shows also at the bottom the lower pulley of the belt conveyor, and at the left a steel spout which is so arranged that material from the roll crusher may be by-passed and spouted direct to the belt conveyor without passing through the gyratories. The roll crusher will handle any stone which the ¾-yd. shovel in the mine will load, and crush it to not over 8 in. In case this material is by-passed direct to the belt conveyor, the rejections from the main revolving screen





(the one-man stone) will be shipped direct to iron furnaces for flux.

The Screening Plant

From the gyratory crushers, or direct from the roll crusher as explained, stone passes to the belt conveyors, a 36-in. special rubber belt with centers 252 ft. 3 in., shown in its completed gallery above housed. The two lower illustrations show the gallery during construction—a steel frame over which metal lath was laid, and then covered with cement by using the cement gun, making a permanent, weather-proof gallery 7 ft. 3 in. high and 9 ft. wide.

The belt, main screen, and shaker screens, as well as the crushers, are individually driven by electric motor through reducing gears. The size of motors and the amount of speed reduction will be given in tabular form later in the article. All worm gear reduction units at this plant were furnished by the Cleveland Worm and Gear Co.

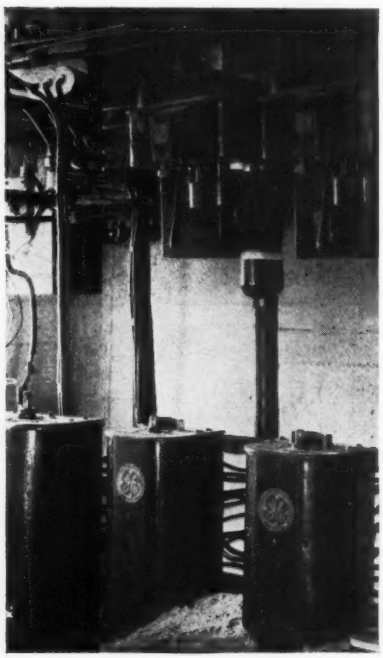
A specially designed revolving screen 5x24 ft. with ¾ in., 1 in., 1¼ in., 1¾ in., and 3 in. perforations, and a ⅝ in. dust jacket over the ¾ in. and part of the 1 in. section of the screen, takes the stone from the belt conveyor and classifies it. The illustration at the right above shows the

main screen in position before the sides and roof of the screen house were in place.

An unusually elastic arrangement of the storage bins is of special interest. Six concrete bins directly below the revolving screen take the screened material. A special arrangement of spouts makes it possible to spout four of the sizes—screenings, 1¼ in., 1¾ in., and 3 in.—into either one of two bins, as desired, while the other two materials, 1 in. and oversize, can be sent direct to any of three bins. This can be better explained by designating the bins by numbers from 1 to 6, starting at the dust jacket end. Screenings may go into bins 1 or 2; 1-in. into bins 2, 3, or 4; 1¼-in. into bins 3 or 4; 1¾-in. into bins 4 or 5; 3-in. into bins 5 or 6; and oversize, into bins 4, 5, or 6. Added spouts could easily be arranged so that any size would have three bins to which it could be spouted direct. The bins have a capacity of about 125 tons each.

The electrical drive has been referred to; at the right is an illustration showing the motor, speed reduction gears, and spur gear which drives the main revolving screen.

The material from the dust bin under the screen goes into one of the storage bins under the main screen, as already explained or it may go on a 14-in. belt conveyor to a shaking screen over the second row of bins north of the first row. This shaking screen produces three sizes of material, 20-mesh, ⅜-in. and ⅝-in., which are spouted into three of the bins of the second row of bins. The fourth bin in this row has no immediate use except as emergency storage, but it may be used later in connection with added screens to be installed in the future. As the plan drawing shows, the screening plant described can be duplicated by adding similar units of screening and bin equipment to the west and in the same line with the present plant.

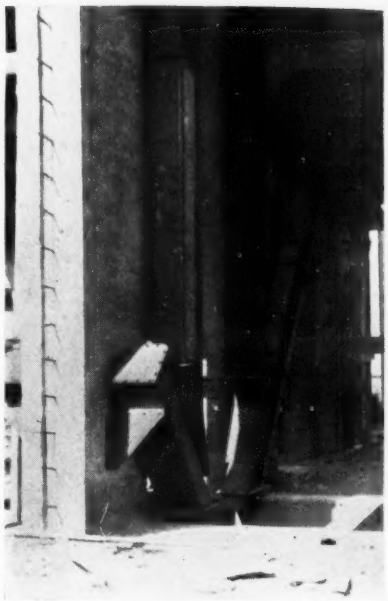


From the bins of the screening plant stone can be drawn by bin gates directly into cars underneath for shipment, or by special chutes described later, it may be transferred to the rotary kiln storage bins.

The Rotary Kiln Installation

The flexibility which was evident in the crushing plant, and still more in the screens and bins of the screening plant, is apparent to a still greater degree in the bins, grinding mill, and kiln of the rotary kiln installation. The straight line production continues to be straight line production, without any extra foot of travel for the material except what is necessary for adequate storage for the kiln. The production line makes a right angle at the rotary storage bins, but this does not affect the direct line of travel of material from mine to freight car.

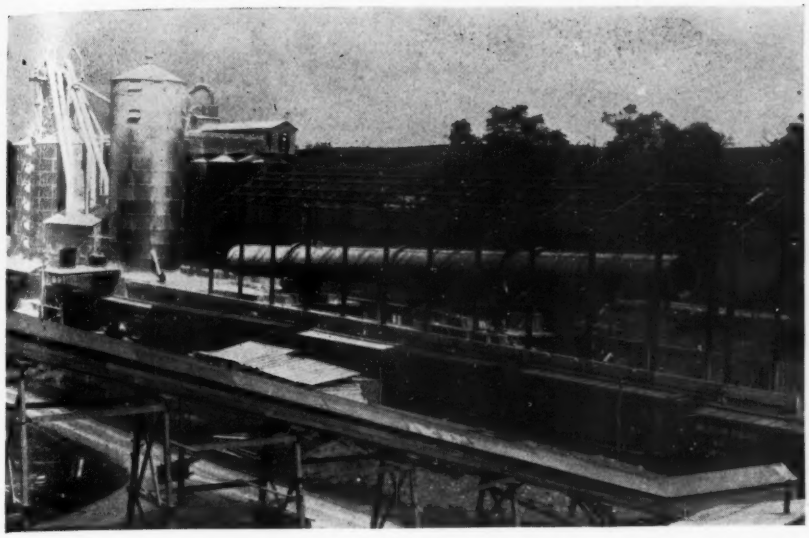
Some special chutes, shown at the right, permit material from the storage bins of the screening plant to pass into a tunnel underneath the loading tracks. In this tunnel a pan conveyor carries the stone to an elevator in the center of the stone storage bunker provided for rotary kiln storage. The elevator, which is indicated on the plan drawing, delivers stone to the movable pan conveyor which is located on top of the storage bunkers, and this pan conveyor on a reversible belt can be set to deliver the stone into any of the bunkers desired.



Another pan conveyor running in a tunnel underneath the bunkers takes material from them and discharges it into a 21x42-in. single roll McLanahan-Stone crusher. The material is elevated to the top of two raw stone bins, screened, and

Following is a table of some of the principal equipment with the size of motors and amount of speed reduction in the reducing gears:

Equipment	Motor, hp.	R.P.M.	Number of Reduction Units	Ratio in Worm Drive
Belt Conveyor—From Crushers to Screen	50	695	1	29 1/2-1
Main Revolving Screen	25	860	1	7 1/2-1
6'x60' Rotary Cooler	40	1150	1	13 2/3-1
Fan	40	1150	1	5 5/6-1
9'x175' Rotary Kiln	60	1150	1	6 4/5-1
Feeder Loaders	3	565	2	9 2/3-1
Elevator	5	855	1	29-1
Elevator	7 1/2	685	1	21-1
Conveyors	3	850	2	40-1
Cross Conveyors	3	1135	1	14 1/2-1
Conveyor	10	1150	1	45-1
Elevator	12	690	1	24-1
Screw Conveyors	15	865	3	13 2/3-1
Elevator	7 1/2	690	2	21-1



the screenings go into one bin while the rejections go into the other.

Next will be a raw stone bunker at the feed end of the 5x22-ft. tube mill, fed by a poidometer to gage the rate of material fed to the tube mill. This mill will produce 15 to 20 tons an hour, depending on the size of the material fed and the fineness desired.

The illustration below at the left shows the tube mill in position, and beyond it the side walls and end wall of the space to be occupied by the rotary kiln storage bunkers. The right hand of the two tunnel-ways shown is for the pan conveyor below the bunkers; the left hand one is for the passage of waste heat from the rotary kiln, in order to keep the stone in the bunkers thawed and dry during the winter when snow, rain, and ice might clog the stone and interfere with the proportions of moisture in the case of wet grinding.

The tube mill is a newly designed four-compartment mill, so divided as to add 25 per cent to the capacity of the mill. It will grind dry stone for storage in the ground stone tank, to be shipped for glass house use, or it will grind the stone for burning in the yet untried semi-wet process. This experiment with the semi-wet process is one which will be watched with keen interest by everyone concerned with the production of lime. The method can be used to advantage where there is a considerable quantity of fine material to be gotten rid of. The principle of this process was explained in Rock Products for September 10, 1921.

Fine material must be moistened and nodulized before being burned, to prevent the fine stone and lime dust from being carried away in the draft of the kiln flame.

The dry process of burning will probably be used ordinarily, and for this stone down to 5/8-in. in size can be burned.

If the wet process is to be used, the dry ground stone goes through the nodulizer, and by means of an elevator into a chute and into the Reeves 9x175 ft. rotary kiln.

The kiln furnace is another new development which may change radically not only methods of lime manufacture, but of cement making also. While this is the first installation of such a furnace for practical work, a demonstration has been made in which the furnace threw a flame 175 ft. for a period of 70 hours, and the designers of the furnace and owners of the plant are both confident that the new furnace will operate successfully.

The furnace burns coal 3/4-in. and under which has passed through a hammer mill to reduce it to this size. In operation the highly volatile gases held in the coal are first driven off, and the residue is later consumed on a new type of grate, this combustion of the residue furnishing the initial heat to drive off the gases, particularly from the larger particles of coal.

The result is a long, low-velocity, expanded flame which permits oxygen to mix with it in traveling, in this way completing the combustion only over a long distance.

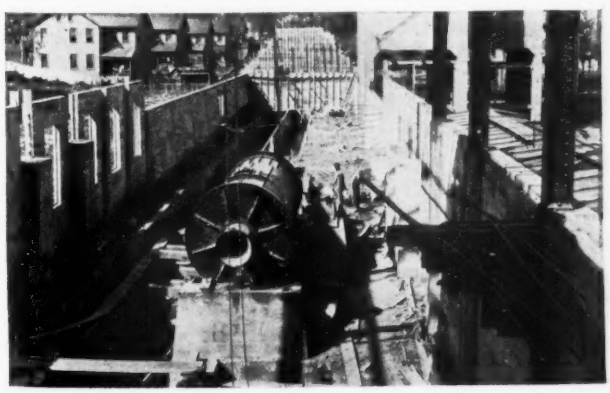
It is not a high heat which results; it is rather a mellow heat more nearly resembling the desirable heat of a wood fire.

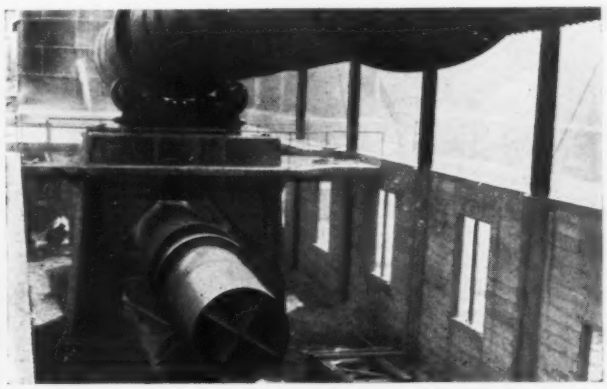
Humidity is added to the flame. This serves to surround the carbon dioxide and permit it to pass off more rapidly. In their passage through the kiln the volatile gases mix with oxygen, and the most combustible burn first. This results in a low temperature—perhaps not over 500 degrees—at the feed or cool end of the kiln, with a temperature gradually increasing to the furnace end. The new grate burns practically all the coal. Much less than 10 per cent of ash remains.

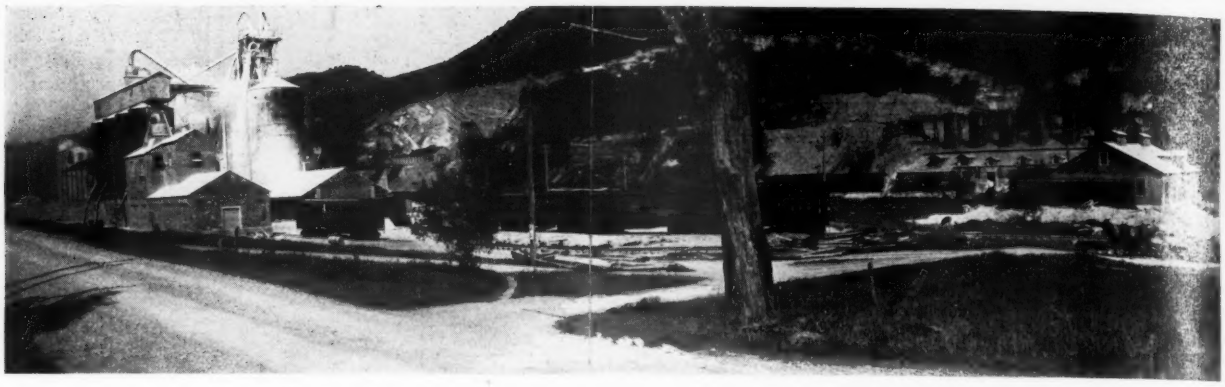
The kiln will burn 8 to 10 tons of lime an hour, and it is expected that about five tons of lime will be burned to one ton of coal.

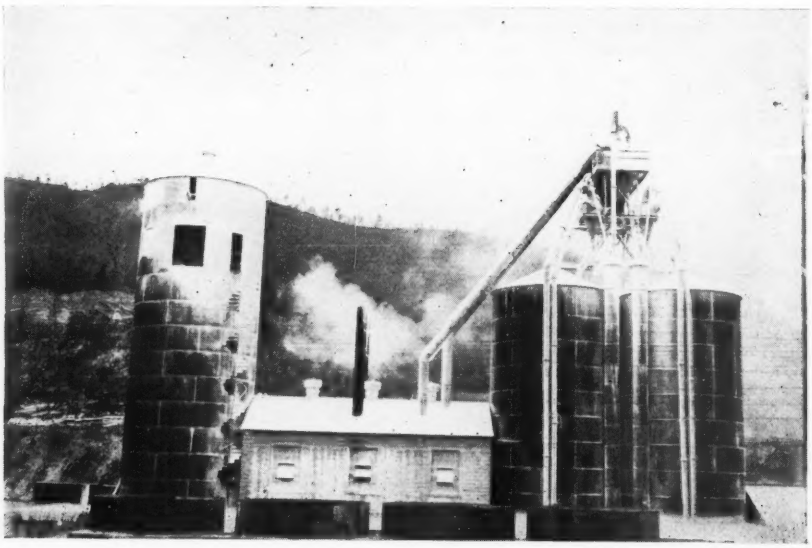
From the kiln the burned lime passes through a 6x60-ft. rotary cooler to the lump lime loading plant or by pan conveyor to a Pennsylvania hammer mill and into the hydrating plant. In the case of semi-wet burning, the nodules will by-pass the hammer mill.

The cooler, with its vanes dividing it into quadrants, is shown in the illustration below, which also shows the firing end of the kiln and the bottom of the hydrate plant ground lime tank.







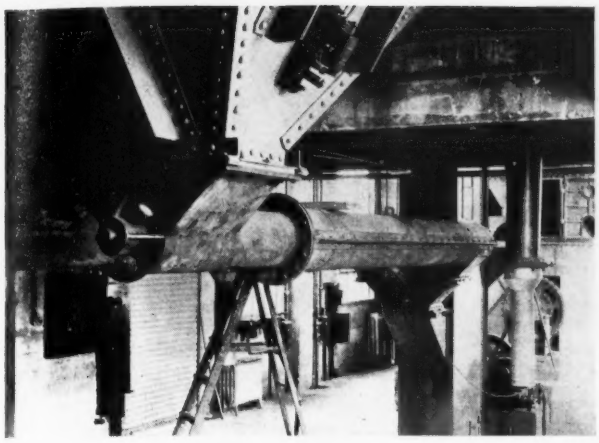


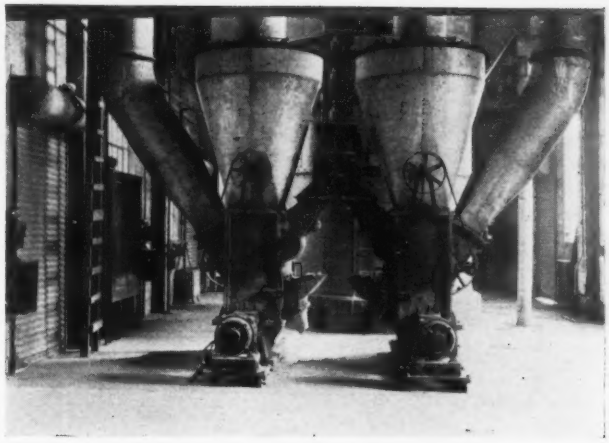
The illustration above, together with the one on the first page of this article, give a comprehensive idea of the Bellefonte plant. Above at the left are the hydrate and ground lime tank, with the skeleton of the rotary kiln plant and the top of the screening plant just showing at the left. Next can be seen one of the quarries, with the hoist house and head frame of the new mine. At the right is the battery of six shaft kilns which have furnished part of the lime to the hydrator, and at the extreme right is the steel barrel plant. The two lower illustrations show the hydrate plant before the ground lime plant was completed

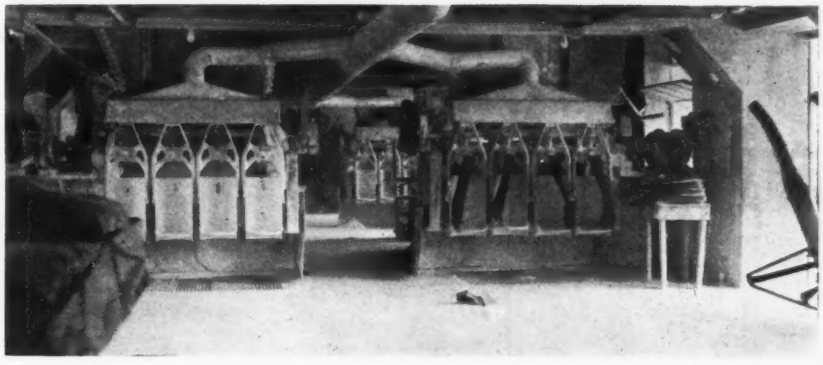
The Hydrate Plant

From the hammer mill the lime is elevated to the top of the ground lime tank of the hydrate plant and discharged over a 20-mesh screen. The material passing through the screen is carried by a 14-in. screw conveyor to another 14-in. screw conveyor located over the four tanks of the ground lime plant, and is discharged into any one of these tanks.

Material passing over the 20-mesh screen goes into the hydrate plant ground lime tank, which is divided vertically into two compartments, one for chemical and one for agricultural lime. Through a 9-in.-12-in. screw conveyor and an elevator the lime passes from the storage tank to the poidometer which automatically weighs the quicklime and regulates the flow of water into the Schaffer hydrator, which hydrates continuously and automatically the lime fed to it. From here the hydrated lime passes through a 12-in. screw conveyor to 2 Raymond mills, where it is pulverized and drawn by fans to the two hydrate storage tanks, one for chemical and one for agricultural lime. Each of these bins has a storage capacity of 440 tons, and on each bin are two four-unit Bates valve bag packers, enough to make bag storage unnecessary. These packing units will handle the largest orders easily; their capacity is greater than any single day's shipment of hydrate anticipated. Hydrate also passes from the collector at the top of the storage tanks through a 14-in. screw conveyor across to the







ground lime plant and by means of another screw conveyor into any of the four bins of this plant. At the present time this air separation is providing a hydrate of which more than 99½ per cent passes the 300-mesh screen.

The hydrate plant has a capacity of about 300 tons in 24 hours.

Tailings from the Raymond mills, unground particles of lime too heavy to be carried over by the air current, fall back and are ejected from the building by a screw conveyor, the delivering end of which is shown in the small illustration shown above. As these tailings pile up they are loaded by hand into a car and taken out and dumped. Later an elevator may reclaim these tailings and return them to a bunker straddling the hydrate and ground lime tanks, from there to be reground.

The two illustrations above show, at the left, the feeder from the ground lime tank, and at the right the two Raymond mills.

Bag loading in any lime plant is always the cause of considerable spillage, breakage of bags, and so on. Instead of leaving this lime on the floor for bag loaders and truckers to tramp about in, gratings in the floor under each of the loading units provide a convenient place to sweep immediately all lime as soon as it gets on the floor. From the conveyor below the grating a suction fan reclaims the lime and returns it to the storage tank. The illustration below shows how clean the bag-loading floor can be kept.

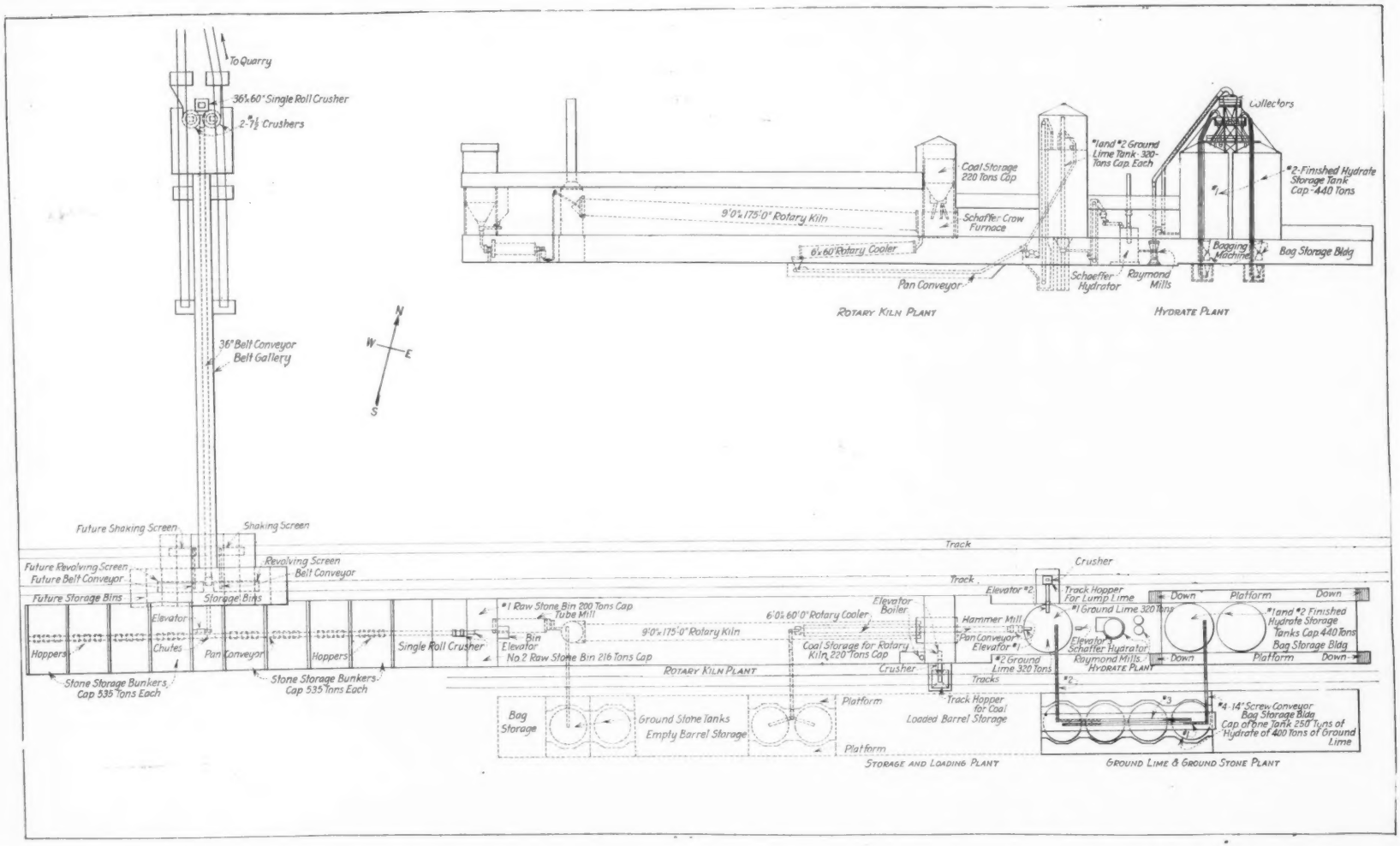
Throughout the hydrate plant, as well as in the crushing, screening, and rotary kiln plants already described, and the ground lime plant which will be next described, there is every evidence not only of careful and expert design, but of an unusual amount of foresight having been used in overcoming even small obstacles and in taking advantage of every known time-saving device in the plant design.

One well-known progressive lime manufacturer expressed himself, after a thorough study of the plant, in the following fashion:

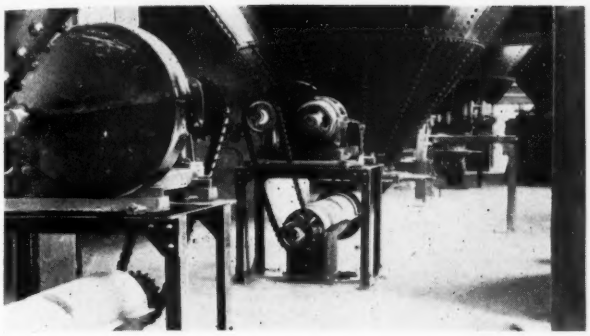
"If anyone had told me before I had visited the plant what it will do, I would have been obliged to class him as a liar; now that I have visited the plant, I believe it will do more than is claimed for it."

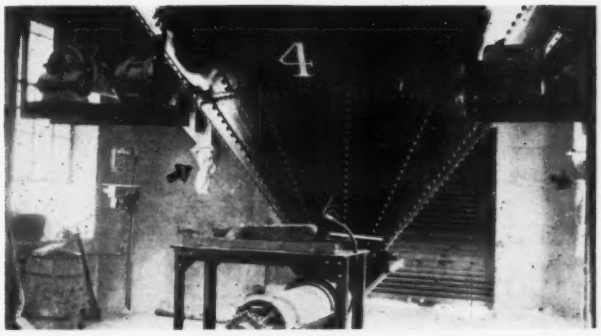
Another lime manufacturer has said: "I have visited practically every lime plant in the country, and many crushing plants, and I believe this is the best arranged and constructed plant in the country."

The design and supervision of construc-



From mine—the shaft of which is but 200 feet from the crushing plant shown—to freight car, the stone and subsequent lime will pass through the various necessary stages of crushing, screening, burning, grinding, hydration, and separation with a minimum both of handling and of distance traveled. This plan shows how production proceeds in an uninterrupted line, and it shows the excellent loading facilities, with a railroad track on each side of the hydrate and ground lime plant. The accompanying article must be read to appreciate the plant's remarkable flexibility and the new and hitherto untried processes which will be carried on here





tion is the work of the Schaffer Engineering and Equipment Co.

The Ground Lime Plant

It is in the ground lime plant that the greatest flexibility of the entire plant is found. This plant is not completely shown in the plan drawing. It consists of the four steel storage tanks, each with a capacity of 250 tons of hydrate or 400 tons of ground lime, and two other tanks, each equipped with a four valve Bates packer, a Raymond mill, and a bag storage capacity.

Over the four storage tanks are two 14-in. screw conveyors, one connected by a similar conveyor with the collector over the hydrate storage tanks and one connected with the 20-mesh screen over the ground lime tank of the hydrate plant.

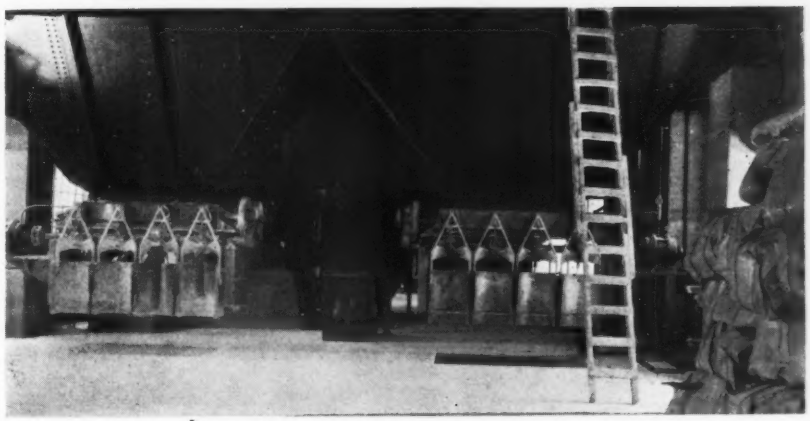
These conveyors permit ground lime or hydrate of any desired fineness to be delivered direct to any one of the four tanks.

A feeder which is installed at the bottom of each tank and a 14-in. screw conveyor below the floor of the ground lime plant, running under the four storage tanks to an elevator, permits loading as explained later.

So much for the method of filling the tanks, and transferring material from tank to tank. To load the material in the tanks ready for shipment at least five methods are available.

First, on No. 4 tank—the tanks are numbered from 1 to 4, from east to west—two feeders have been attached, and from the spouts of these feeders, indicated by arrows in the illustration, 20-mesh ground lime is loaded into steel drums holding 1000 to 1400 lb.

Tank No. 2 is being used at the present time for a very fine, air-separation hydrate, more than 99½ per cent of which passes the 300-mesh screen. Tests frequently give 99.60 per cent through the 325 screen, and tests have given as high as 99.81 per cent through the 325 screen. This material is drawn by a fan from the No. 1 tank of the hydrate plant and deposited in this tank in the ground lime plant, and from this tank it is bagged by a 2-tube machine and shipped for use in grease making. Bagging machines can



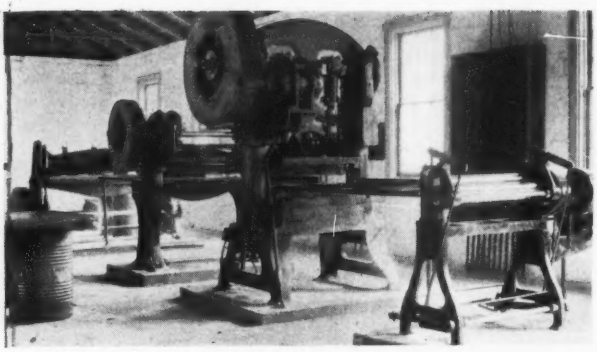
be attached to any of the tanks; this provides the second way of preparing the lime for shipment.

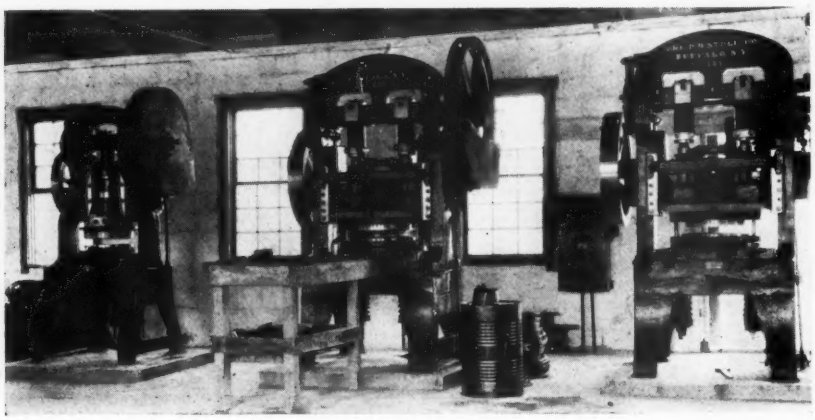
The third way of loading direct from the tank is provided by loading spouts on the outside of the tanks through which bulk lime can be loaded direct into cars, as shown in the illustration above.

The two remaining ways of loading from the tanks require the use of the conveyor below the tanks and the elevator to deposit the lime into one of two bunkers, each equipped with a four valve Bates packer; or by this same route direct into the cars by spouts instead of into the bunkers.

A Raymond roll mill just back of the bagging machine shown above can be used for regrinding the 20-mesh lime to a fineness of 100 to 200 mesh. Lime is conveyed by the underground screw conveyor from tank No. 4 to the elevator and into a bunker over the Raymond mill.

So far only ground lime and hydrate have been mentioned as products to be stored in the ground lime plant tanks. Ground limestone can also be stored here. Stone ¾-in. and under can be unloaded through a track hopper just north of the hydrator plant, shown on the drawing, then through a single roll 24x24-in. McLanahan stone crusher by elevator No. 2,





by-passed to the hammer mill, and from here by elevator No. 1 and conveyors Nos. 2 and 3 into any tank of the ground lime plant. It can then be reclaimed by the 14-in. screw conveyor below and passed through the Raymond mill, where it is pulverized and then discharged into one of the bunkers ready to be loaded into bags.

The Barrel Plant

For shipping lump lime and ground lime, the company makes its own steel barrels in a separate plant. The process of making the barrels was explained in Rock Products for May 6, and the three illustrations here show the equipment in the company's barrel shop. The shop has been in operation only two months at about 200 barrels a day—the capacity of the plant when working full time with seven men is 600 to 700 barrels a day—and the results have been very satisfactory. The cost of each barrel is around 65 cents, as determined by accurate cost figures over two months of experience. This includes interest, depreciation, and all legitimate charges.

Coal Dealers to Co-Operate with Hoover

At a conference with representatives of all branches of the coal industry, the coal dealers promised their co-operation in holding down prices at a meeting in Washington on June 15. Secretary Hoover, said the dispatch, emerged from the conference victorious in his fight to protect the public during the strike emergency.

In those fields where no price basis has been established, comprising about 15 to 20 per cent of the total bituminous tonnage, Mr. Hoover suggested that fair prices should be adjusted in each individual case. While complexity of local conditions make the establishment of prices difficult in these districts, Mr. Hoover says his suggestion would be accepted in the Pennsylvania fields. "It has been settled," said he, "that the retail association will co-operate to the end that all coal will be sold at cost plus a reasonable selling charge; that in localities where bituminous coal is sold for household purposes existing stocks, as of June 1, of unsold pre-strike and contract coal be reserved for the smaller household trade and such coal be sold at prices based upon cost plus usual handling charges.

"The retail prices of other coal would be based upon average purchase prices with the usual handling charges. Retailers are asked to report to the administration any price demands of operators that are not in line with the $3.50 maximum. They are also asked to aid in preventing speculative results.

"The impression has been given in some quarters that the maximum price was the minimum price, due to the persistent misunderstanding of elements both inside and out of the industry. There is evidence of but few failures of the agreement. The average price of coal in districts where the maximum is $3.50," he said, "is $3.00."

Mr. Hoover also announced that anthracite coal operators agreed not to advance the prices over those of last week, which were slightly below those of the early strike period. In discussing the coal situation generally, Mr. Hoover said that any settlement of the coal strike would be temporary unless some steps were taken to stabilize the industry.

Oliver Bowles Receives Another Degree

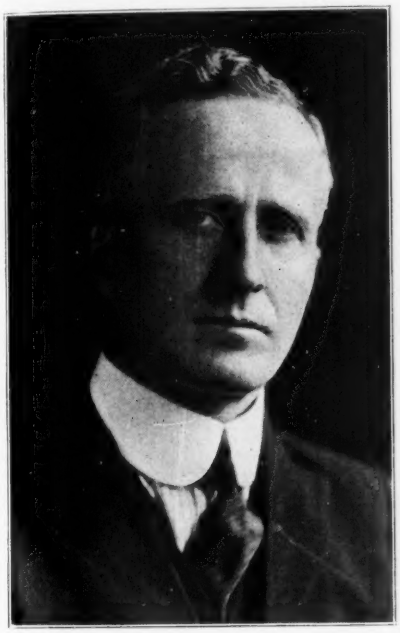
The degree of Doctor of Philosophy was conferred on Oliver Bowles on June 7 by the George Washington University. As is well known, Dr. Bowles is the mineral technologist of the United States Bureau of Mines. He is also a Bachelor and Master of Arts of the University of Toronto.

Dr. Bowles, specializing in geology and mineralogy, has been engaged for a number of years in the rock products industry, specializing in problems of safety, efficiency, and waste elimination. He has published several bulletins on quarry subjects, such as Bureau of Mines Bulletin 106, "The Technology of Marble Quarrying"; U. S. Geological Survey Bulletin 663, "The Structural and Ornamental Stone of Minnesota"; Bureau of Mines Bulletin 124, "Sandstone Quarrying in the United States"; Bulletin 160, "Rock Quarrying for Cement Manufacturers."

The past two years he has devoted largely to the slate industry, the results of such work being now in press. Limestone quarrying for lime manufacturers is the problem to which he is now giving attention.

Merged With the Charles Warner Company

THE rapid enlargements of the plants of the American Lime & Stone Co., during the past year or two by the erection of the big plant at Bellefonte and improvements on some of the other plants, such as Union Furnace, has made it desirable for the American Lime & Stone Co., to arrange for permanent financing of part of the outlay.



Charles Warner, president of the American Co.

Messrs. Morris and McLanahan have completed negotiations with a banking syndicate in Philadelphia, composed of the prominent bond houses of Parsley Brothers & Co., West & Co., and Graham, Parsons & Co., to underwrite a bond issue of $1,100,000 first-mortgage 7 per cent bonds. These bonds are now being offered for sale.

In connection with this step, the Morris and McLanahan interests evolved a plan of merging the management of the American Co., with one of the large and progressive companies in eastern Pennsylvania, the Charles Warner Co., who are extensive manufacturers of magnesium lime products in that district. This merger of management of the two companies produces a very strong affiliation that is a considerable advantage for all interests, as the Warner Co.'s extensive sales organization in Philadelphia and New York will assist in the distribution of the increased production of the Bellefonte plants and aid in developing the general business of the American Co., throughout the Central and Western markets.

To carry through these steps, A. G. Morris has been elected chairman of the board of directors of the enlarged American Co., and Charles Warner, president of the Charles Warner Co., has been elected president of the American Co.

The board of directors of the American Co., has been enlarged to 11 in number, including A. G. Morris, J. King McLanahan, Jr., C. A. Morris, E. G. Parsley, of Parsley Bros. & Co., G. D. Montgomery, of West & Co., Mr. Steel, of Graham, Parsons & Co., Charles Warner, Alfred D. Warner, Jr., Irving Warner, Fred A. Daboll and C. C. Bye, of the Charles Warner Co.

Irving Warner, general manager of the American Co.

The detailed management responsibility in the general administration of the American Co., is thrown upon the Warner interests by the special desire of A. G. Morris and J. King McLanahan, Jr., who wish to be relieved of the detailed responsibilities of administration. But the policies of the company will be continued through co-operation of the old and new officials in advancing the general interest of the American Co.

J. King McLanahan, Jr., of Hollidaysburg, one of the large stockholders of the American Co., will serve as vice-president; Irving Warner, has been selected as general manager of the company and will establish headquarters at Bellefonte; and Alfred D. Warner, Jr., has been elected vice-president and treasurer of the company.

Charles Morris will continue as general superintendent of the Bellefonte group of plants, under the present plans.

It is believed that these steps will materially assist the development of the American Co., one of the largest operations of its kind in this section of the country, since it will add to the present management additional managerial and financial force which should strengthen and more rapidly promote the valuable opportunities the company has for extending its profitable operation. The new plant at Bellefonte will be rushed to completion within the next two or three months so as to be in position to add to the earnings of the company with the fall expansion in business demand.

"One of the Elements in Rate Making"

THE quoted matter below is an abstract of a recent letter from the Silicon Products Co., of Ridgway, Pa., to the Interstate Commerce Commission at Washington, D. C., dated June 14:

"We appreciate your several favors in connection with what we consider discrimination on the part of the Pennsylvania Railroad Company. . . .

"There is just one thing in your letter of May 29 which we think is a striking example of the case we suggest—namely, you mention the fact that 'one of the elements in rate making is the value of the property transported.' With that in mind, how would you account for the fact that the Pennsylvania hauls iron ore from Ashtabula to Pittsburgh, a distance of 124.5 miles, for 82 cents per net ton, while the value of the ore is $5.55 per ton? Just how does this company or whatever commission it is that allow this condition to prevail, charge us 80 cents per ton to haul a ton of sand from Daguscahonda to Ridgway, a distance of five miles, while the value of the sand is $2 per ton?

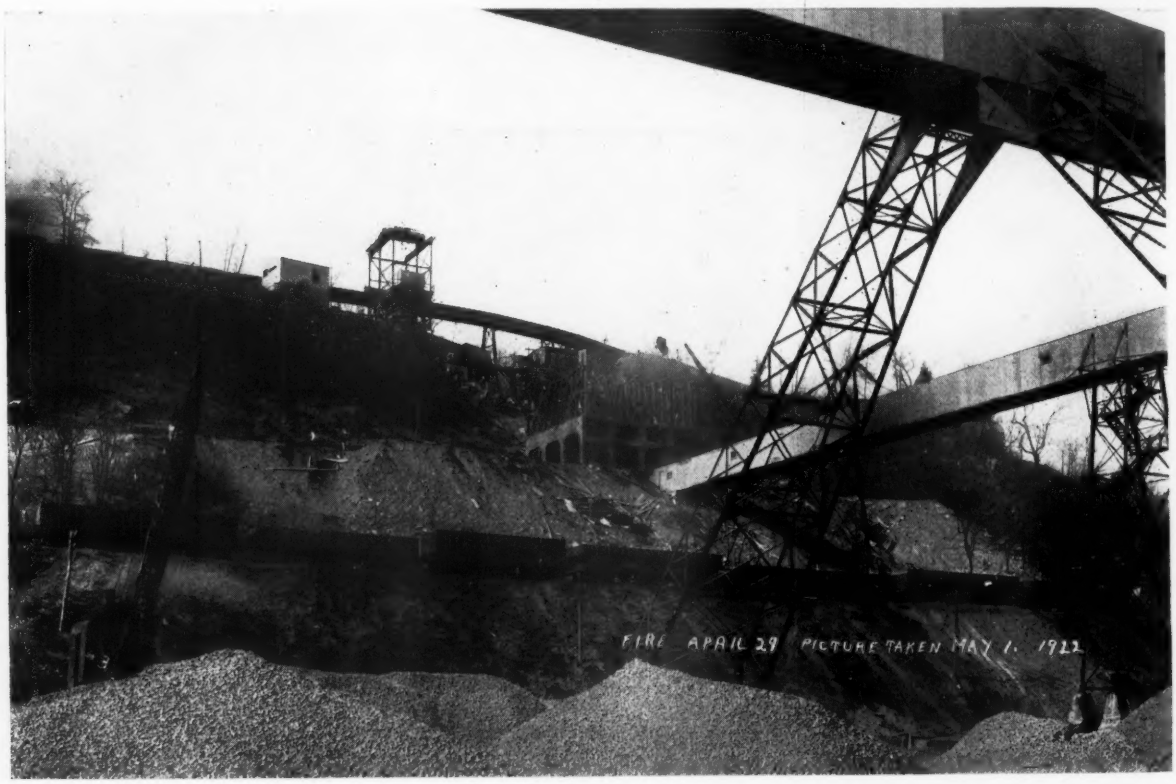
"It does not look to us as though the Pennsylvania Railroad Company has any argument whatever, especially in view of the fact that this same company hauls sand from Duboistown to Williamsport, a distance of 7.2 miles, for 42 cents a ton, while they charge us 80 cents a ton to haul the same commodity a distance of five miles.

"While we are not now anarchists or socialists, such things as these would have a tendency to make us lean that way."

Swift Reconstruction of the Canada Crushed Stone Company Plant

Fire destroyed the large screen house, the conveyor system, and the 72-inch roll house of this company recently. While the fire was still burning the officials were arranging with the engineers for the plant's reconstruction. Wonderful progress has been made through the co-operation of all concerned

EVEN while the fire which destroyed the greater part of the plant of the Canada Crushed Stone Co., at Dundas, Ont., on April 29 was still burning, the officials of the company were in communication with their consulting engineer, J. C. Buckbee, of Chicago, and arranging to have him come to Dundas and start the work of reconstruction.



The plant of the Canada Crushed Stone Co., at Dundas, Ont., after the fire on April 29, in which a large part of the quarry equipment was destroyed

This fire destroyed the large screen house, the conveyor system, and the 72-in. roll house. A strong southwest wind caused the fire to gain headway at great speed and rapidly destroy the screen house, the large section of the conveyor system between the screen house and the roll house, and the timber work of the latter building.

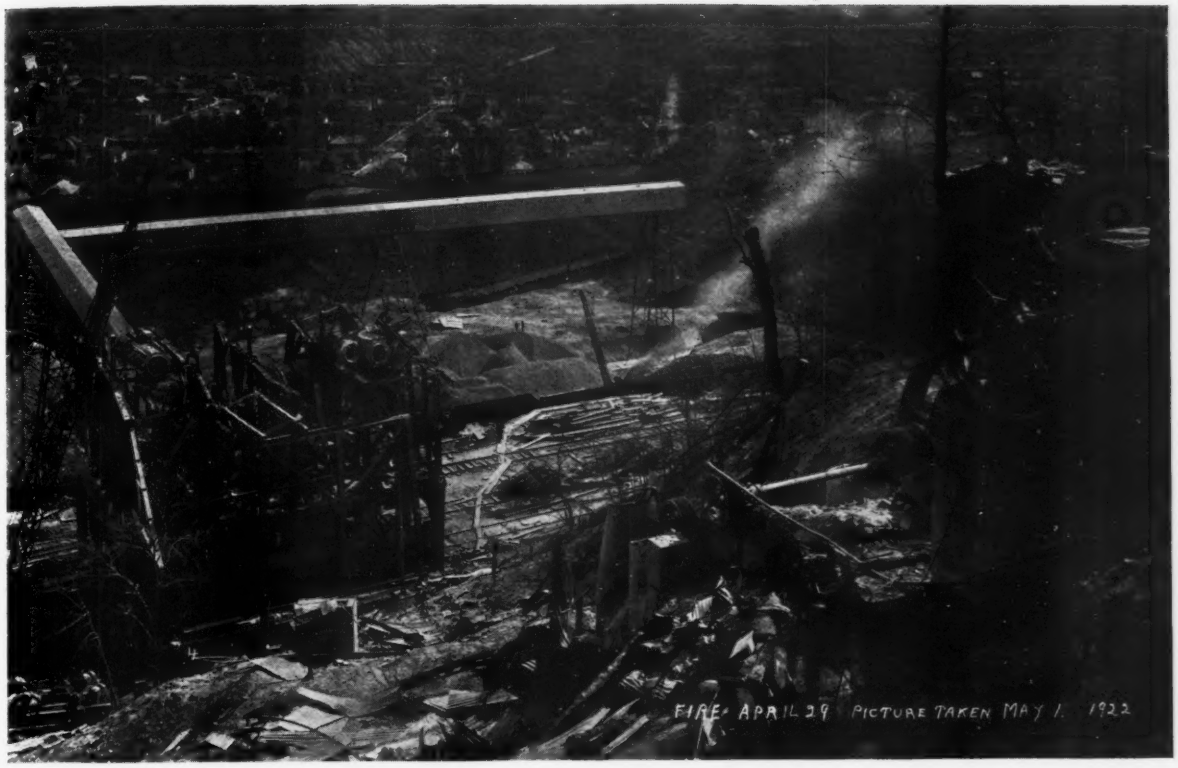
There were fire hose and extinguishers on the trestles, but the rapidity of the fire made it impossible for the men to use these means. They had to escape from the fire at once. Fortunately, there was no loss of life, a few of the men suffering minor injuries from burns.

The transformer house, which is to the right of the plant, near the mountain top, and out of the path of the flames, escaped damage entirely, as did the big crusher at the top of the mountain.

The plant had been closed down for a month before the fire for extensive repairs and alterations to the screen house and to install four new shakers. The new machinery installed was also destroyed.

Arrangements were made to have a locomotive crane installed on the job to get to work and clean away the wreckage. There were the men employed on the plant and the wrecking crew which came with the crane, making a large force to go to work the following Monday morning. At an officials' meeting on the next day a plan of the proposed new plant was prepared by the engineer and adopted. The steel contractors were instructed to begin work at once. On Monday, May 8, the contractors on the concrete work were beginning the erection of the form work.

Today all of the conveying machinery, the motors, and all of the transmission equipment are on the ground and ready for installation. The four new 60-in. screens and the four 7x12 double-deck shaking screens were furnished by the Allis-Chal-



The photograph of this illustration was taken on May 1. The large locomotive crane is cleaning up the wreckage of the screen house. On top of the steel work is what is left of the four 48-in. x 30-ft. screens

mers Co., and arrived in Dundas on May 25. The Link-Belt Co. has completed the conveyors in the conveyor bridges.

All that is possible is being done to get the company back on its usual production basis. The company is being highly commended for its prompt steps to restore the burned plant and make it even better and more efficient than it was before the fire.

Here is the fifth week's progress on the steel work of the bin building. Two shakers have been elevated to the shaker floor, the steel for the 54-in. rollhouse has been set in place, and the two conveyor bridges are practically completed to half-way bents

Cement Trials in Illinois and New York

Federal indictment is returned against the Mid-West manufacturers. Jury in Eastern district case disagrees and case will be re-tried

A FEDERAL grand jury has returned an indictment against 26 corporations and 48 individuals composing the organization known as the Midwest Cement and Statistical Bureau. The charge is that this organization acts in violation of the Sherman anti-trust law. These indictments are the result of the government investigation of the past two years and follow the New York indictment of 74 corporations and 40 individuals.

According to District-Attorney Clyne the government's attention was called to the bureau two years ago and operatives of the Department of Justice have been making investigations. Now the Federal authorities allege that the bureau has from time to time called meetings of its membership and "fixed the prices at which cement shall be sold between the various meetings."

It is said that Federal Judge Page will hear the case and Mr. Clyne will head the government's legal forces.

Eight counts in the indictment charge a combination in restraint of trade, conspiracy, and a violation of the Sherman act against the following companies: The Lehigh, Aetna, Alpha, Atlas, Cape Girardeau, Castilia, Continental, Crescent, Diamond, Hawkeye, Huron, Indiana, Kosmos, Michigan, Missouri, Newaygo, Northwestern, Peerless, Peninsular, Sandusky, Universal, Wolverine, Wyandotte, Marquette, and the Wellston Iron Furnace Co.

In the case of the cement manufacturers in the East, the jury was unable to agree after 34 hours' session, and so reported to Judge Knox sitting in the Federal court of the southern district of New York. The case will be re-tried as soon as a presiding judge can be assigned. In the meanwhile it is believed that the civil case against the cement makers, seeking primarily the dissolution of the Cement Manufacturers' Protective Association, will continue.

In summing up for the government Judge Fowler, senior counsel, asserted that it was not necessary for him to prove that the defendants had actually signed an agreement to restrain commerce, but that the evidence had shown the defendants to have followed a system of exchanging statistical information that could not but lead to uniform prices. Since nearly every witness testified as to the uniformity of price, bag charges, discount rates, bin-test charges and bag return allowances, he felt the case was indisputably proven for the government.

Col. H. L. Stimson, chief defense counsel, in summing up his case, asserted that during the whole trial no clear statement as to what the indictment charged had been made by the government. He said that to prove the charge that the defendants had fixed excessive prices by agreement and that they had sold in quantities fixed by agreement, specific charges in the indictment, they would have had to follow one of three plans: (1) Prorate the production among the defendant mills from year to year according to the total production; (2) divide up the territory so there would be no competition as between mills in the same territory; or (3) pool earnings. No direct evidence had been introduced to substantiate any of these charges, was his contention.

As to the uniformity of price that was testified to the defense maintained that competition often was so keen that a price uniformity was inevitable. Such a standardized product was susceptible of the same price uniformity as any other standard product, regulated from a central source as to quality of materials, standard tests, etc.

The defense based its case almost entirely on the theory that uniformity in price and in trade practices did not at all indicate the existence of a conspiracy. It held up as a principle of economics that the keener the competition the more uniform the price and the methods of disposing of the product.

As to the general charge that cement prices had been excessively high and that the manufacturers had profited liberally thereby the defense put in evidence figures compiled by the Bureau of Labor Statistics showing that of several score commodities cement had risen least of all, save beef cattle and crude rubber, and that during the time charged in the indictment the net return for most mills on invested capital as well as on plant value was under 5 per cent, whereas a return double that was considered more or less economically insufficient.

In charging the jury Judge Knox told the jury that attendance at meetings of the protective association in itself was not incriminating; that participation alone in its activities, if it were a conspiracy, was a liability; that membership in either the Portland Cement Association or the Cement Manufacturers' Protective Association did not constitute proof of knowledge that a conspiracy existed, if it actually did exist; that there were certain associations that did lawfully exist merely as clearing-houses for statistical and credit information; that the freight rate books, even with errors found in them, were lawful except as they may have been used as a means to price control; that uniformity of price might result from other causes than the existence of an express agreement, though such uniformity of price should be taken into account in weighing the whole evidence; that the good faith of the defendants in securing the advice of government officers in connection with their activities did not absolve them from blame if they actually did what they were charged with.

Judge Knox further charged that the license agreement could not, in itself, convict the defendants, no matter how reprehensible their activities under that association might have been. He also said that the defense did not deny that there had been some trade restraint, but vigorously denied the existence of unreasonable restraint, which is made unlawful by the Sherman act.

In judging of the evidence he instructed the jury when trying to settle whether a conspiracy actually existed to determine, from the evidence, if the price had been excessive, if the production had been such that the price had been unreasonably controlled.

The Department of Justice at Washington has announced that a retrial of the Eastern group of the cement cases will be undertaken as speedily as possible. The department's announcement said that at a conference between Attorney-General Daugherty and Colonel William Hayward, United States Attorney for the Southern District of New York, who came to Washington for the purpose, decision was reached for "vigorous prosecution" of the cement case and other anti-trust cases in the New York district.

The case against the Central group in the cement combination will come to trial in Chicago in June, the department said, adding that a third case on a civil bill is awaiting action in Denver.

The cement case against the Atlas Portland Cement Co. and others will be taken up for retrial in accordance with an announcement made by District Attorney Hayward a short time ago following the disagreement of the jury.

"Scarcity of judges and the present crowded condition of the dockets is a factor with which the department is obligated to reckon," it added, "The retrial of this case will be inaugurated as soon as a judge to try the case is available."

Hoover Coal Plan Commended

THE director of the United States Geological Survey, George Otis Smith, has stated:

"After attending the conference which the Secretary of Commerce has had with the coal operators, as well as living with the coal question for weeks, I am fully convinced that the plan Secretary Hoover is engineering in the interest of the public holds a larger promise of keeping coal prices down than any other move that is feasible at this time.

"In simple terms of current coal production and consumption, the present situation is loaded. Since April 1 our mines have put on the cars only about half as much coal as the country has burned. Fortunately, the output is slowly increasing, but no possible stocks of coal in storage can long stand this drain of 3½ to 4 million tons a week. Yet, the complacent public sleeps, seemingly awaiting some explosion to arouse it to action. Such an effective alarm could come in the shape of a sudden jump in coal prices, but Mr. Hoover and the coal operators have not thought it safe to permit the past to be repeated, and they are agreed that the safety-first move is to put some definite limit on prices.

"A buyers' panic and a runaway market usually happen at the same time, and each aggravates the other. Consumers with foresight, especially the largest consumers, bought large supplies of coal while the buying was good, but others who were less wise did not stock up, and these 'foolish virgins,' as Secretary Hoover has called them, will be the first to find themselves short of fuel. Their plight is partly of their own making, and to judge from the $8 and $10 spot prices of 1920, many of them, once awake to their need, will try to buy at any price.

"It is obvious that with this condition of under-supply of many consumers coal production needs to be stimulated, and a fair price to accomplish most must be a generous price. Furthermore, the secretary's decision as to a limiting price had to be reached without delay. It was imperative that even the high cost producer be encouraged to contribute his tonnage, and therefore a fair maximum price was established for as wide a territory as possible, and the coal operators were urged to speed up production. Tons mined are far more important to the country than cents saved.

"The buying public should keep in mind that the $3.50 which is set up as a fair price for most of the coal fields south of the Ohio and Potomac is a maximum price and that it applies only to spot coal. More than half of the present output of these fields is still under contract, and in view of the steadier business these contracts permit the contract coal is normally delivered at much lower figures, and those who will insure themselves with new contracts can also get much better terms than this spot price.

"Moreover, the maximum fair price is set up as only a temporary measure to steady the nerves of what threatened to be a runaway market. It is hoped that this $3.50 price will become only a mark to show where the 1922 price of coal was halted. A repetition of the $8, $9 and $10 prices of 1920 is what Mr. Hoover is trying to avoid. The public should remember that two weeks ago, when the leading coal producers were first called to Washington, the price had begun to jump to $4 and even higher. The appeal then made to the sellers of coal for co-operation fortunately met with a sympathetic response, for the coal industry knows better than the public the dangers of a runaway market to all concerned."

Nordale Joins Crow Organization

AMONG the recent executive acquisitions to Waller Crow, Inc., engineers and counsellors in industrial operations and finance, 327 South LaSalle street, Chicago, is Carleton E. Nordale, a well-known mining and industrial engineer.

Carleton E. Nordale

Mr. Nordale is a product of the University of Minnesota and the Michigan College of Mines, with several years of practical experience in the metal mines of Utah and Idaho. He was chief chemist for a large mining enterprise besides doing considerable research work on the design and installation of flotation units in the mills. His experience in the examination of properties, both in the metallic and non-metallic line, was wide when he was in private engineering practice in Chicago. Among other work handled by Mr. Nordale is the design and construction of special machines for industrial purposes along the lines of grinding and pulverizing units and many material handling devices.

11,017 Miles of Federal-Aid Roads Built Since 1916

IT is reported by the Bureau of Public Roads that on March 31, 1922, there had been completed since 1916 a total of 11,017 miles of Federal-Aid roads. The following table gives the types and the mileage and average costs:

Type	Cost per mile	Miles constructed
Graded and drained	$ 9,200	1752
Sand-clay	6,850	1338
Gravel	9,230	4389
Water-bound macadam	14,000	294
Bituminous macadam	25,720	382
Bituminous concrete	43,500	511
Concrete	36,600	2104
Brick	46,875	224

The major portion of the work has been done since 1918. It is incorrect to assume that the rise in prices is due entirely to increased cost of labor and materials. During this period there was a general tendency to construct wider and more substantial roads to meet the needs of modern traffic.

Bureau of Mines' Study of Fluorspar Industry

THE mineral technologist of the Bureau of Mines, R. B. Ladoo, spent the month of April in examining the fluorspar deposits of the Western states. On this trip fluorspar mines and mills were examined in New Mexico, Nevada, and Colorado. Information obtainable on fluorspar deposits in Arizona, California and Utah indicated that the deposits were not sufficiently important to warrant examination. None of the mines or mills visited was in operation, and it was evident that many of the deposits opened, particularly those of New Mexico, were war developments which cannot be considered of great importance under normal conditions. The information obtained on this trip will be used as the basis of a report on the mining of fluorspar in the Western states.

Quarried from Life

By Liman Sandrock

"J. J."—and a Few Other Sullivans

IT would seem that wherever a profession or industry thrives and grows big with success, there's a Sullivan sure to be pushing and shoving behind it. The arts, the sciences—even in pugilism—there's a Sullivan, and as for war— You tell 'em, Al! May be, Brian Boru was one of them? If he had been born in the 18th century instead of the 10th, he would have given a leap'—for he was a soople man, lads—an' come on over.

In our own industry we have them. There's A. J., of the Inland; Tom, of the National, Omaha— But let's talk right now about J. J., of the Dolese & Shepard Co., in Chicago.

When I approached this courteous, kindly gentleman in answer to his consent to be interviewed, he wore the air of a man about to attend his own funeral. He stood it bravely, however, and as the doctor we think the operation was a huge success, barring the pain we caused him.

J. J. and I in our early youth used to chuck stones in the Kill von Kull—he from off the New Jersey shore and I from Staten Island, the Kill separating us from a nearer acquaintance. His good father and mother came to New Jersey from the tight little isle on their wedding trip.

John James received a public school education and later went into railroading, as did Brother Pinnegar, Edwin Brooker, and others in the industry. A short course in railroading seemingly gives a young man a sense of the fitness of the realities, even if later he has to battle with the soulless railroad for decent, living freight rates.

Mr. Sullivan's first experience in the stone industry was when he came to Chicago, in 1898, taking a position with the Dolese & Shepard Co. Today, he is its sales manager. You must know this firm, for any old-timer will tell you that it began business here in the sixties and that now it is one of the largest stone producers in this vicinity. Its plant at Gary has a capacity of about 500 cu. yd. daily.

And how old is he? Tom Reed, when speaker of the National House, was wont to remark that no *gentleman* weighed over 200 pounds (he tipped the beam at 300), and by the same token, no gentleman in active service ever gets to be over—you say it! Talking ages is like commenting on a bald head—it's funny on the other fellow.

His favorite sports are baseball and going to conventions, and he proudly told me that he has not missed a single convention since the first one started in Chicago.

If you were here during the January convention of the National Crushed Stone Association, you probably met him as one of the entertainment committee. And without offending that Volstead feller and Lucy Gaston Page, we bet that you had your soddy pop and Camels—all you could drink and smoke. And we call on that other Sullivan, A. J., and Fred Murphy to prove it. A. J. has a specially winning smile, and we won three or four of them from him personally. 'Twas a grand and glorious committee!

J. J. Sullivan

Mr. Sullivan has read Rock Products since it was in its swaddling clothes, and the many nice things he said about us brought a blush to our veteran cheek that would make the automobile's "stop" light look like a snuffed candle.

As for the "few other Sullivans," we will, at no late date, get into closer touch with them, if only for substantiation of our assertion that they bulk large in the industry.

Ecclesiastes: "There Is No New Thing Under the Sun"

AS Judge Landis was wont to remark, "Don't it beat hell!" Last issue one of our staff happened upon a contemporary's story telling how lime was a protective against rust. It was a good "hint and help," and into that department it went.

Now, "Rocky" tells him that this story was originally published in Rock Products a year or more ago. Since then it has gone the rounds of our contemporaries. The editor's only defense was that of Dana of the New York *Sun* when brought to like task: "Well, it was good, wasn't it? So I used it again."

While Holy Writ says that there is nothing new under the sun—and Messrs. Landis and Dana also help our case—we must admit that Editor Rockwood's attitude of saving our space for *new* material will rule our future conduct. But say—isn't Landis right?

They Said It

Will we soon have to say, "Your excellency" instead of "health respectfully" to Putnam county's beloved son? You must know that A. P. Sandles, already an "Honorable," is a gubernatorial candidate for Ohio's choicest seat. He ran against Harmon in 1908 and Cox in 1916. Good luck, A. P., and invite us to the inauguration!

Crow, Catchpole & Co., Ltd., are producers of "road stone" at Barking, Essex, England. Their phone is East Ham and the cable code "Crowsnest." Roll your own!

W. Scott Eames, New Haven Trap Rock Co.: "The reduction in freight rates will help stabilize and have a moral effect in increasing business and the stone producers will have marked improvement in business all over the country. Our shipments by rail have increased 30 per cent over last year for May and we feel that this reduction will greatly increase our business."

Freight rates on rabbit skins have been held to be not unreasonable. These skins are used for felt for hats. We bet a high hat that this particular carrier packs a left hind foot for luck.

John W. Stull, Liberty Lime and Stone Co.: "There are as many sizes prescribed in specifications as there are engineers. I do not think it difficult to get standard sizes adopted if the crushed stone people would present the matter in its proper light."

Quarry Managers' Journal (London) wants to add to a list of millionaires who made their money in pink pills, grape nuts and pickles the names of quarry owners who made a million in their industry. A quarry owner with a million—he would have to add pickles, nuts and pills as a side line. Migod! as Bill Hale Thompson would say.

This page is yours as well as ours. Tell us something bright and kindly about your friends—and they in turn will tell us about you. Then we can broadcast it.

Editorial Comment

The Lime Convention

A year of remarkable progress for the lime industry closed with the annual convention of the National Lime Association in Cleveland, the week of June 14. The way to a year of still greater progress and achievement is opened through the leadership of the same men who have so successfully shaped the policies of the association for the past three or four years. For more and more are lime manufacturers beginning to view their industry in its true light, as the production of a basic commodity, the uses for which are of infinite variety. They are realizing that with such a commodity research work of the highest order is a commercial necessity; and research work means the investment of money, time and patience. The progress made in the year just ended leaves no doubt with forward-looking lime manufacturers of the wisdom of such an investment.

The 1922 convention of the lime industry was the first to be attended by a considerable group of chemists and technical experts from the various industries which make use of lime—in a large measure, the first public evidence of the acceptance of lime manufacture as a basic chemical industry. More than that, the attendance of these men was a real tribute to the now recognized high standing among technical men of the research department of the association.

With a greater technical knowledge of lime will inevitably come a greater use of lime, and the higher will the lime industry rise in the estimation of the industrial world.

Advertise Now

Records followed by records. That is the situation in the construction industry, as reported by the F. W. Dodge Co. In April all previous records for volume of construction were passed; then in May the total figures were 3 per cent higher than in April. From January 1 to June 1 the volume of construction started is greater than recorded for the same period of any previous year, and it is 61 per cent ahead of the corresponding period of 1921.

Naturally, this boom in building construction is reflected in better business most everywhere among rock products producers. And each operator, as he pockets the extra profit, smiles to himself and takes the credit for being a good business man.

Of course he is a good business man. But could he have done better? Do the thousands of individual builders, architects and contractors know the real value of cement, lime, crushed stone, sand, gravel, gypsum, slate and other materials which are quarried or dug, as compared with other products which may partly or wholly replace these materials, such as steel, lumber, brick, tile and prepared roofing? "The wider use of lime depends on a fuller knowledge of the utility of lime, rather than on salesmanship, as that term is commonly used," says Dr. M. E. Holmes, and the same statement can be applied to the other rock products.

During the months and the years preceding the present building boom were the uses and the merits of the several products studied, and their valuable qualities preached broadcast to prospective users? The man who is convinced that your product is the best will seldom buy any other, even though your price may be higher. With more publicity preceding the boom, would not profits have been correspondingly greater?

There is still much to be gained by well-planned advertising of your product. Construction is going to continue, and you want as large a share as possible.

A Victory for Organization

Until a very recent decision of the Interstate Commerce Commission, producers of slate were clearly suffering from a discrimination in freight rates. From any viewpoint, the higher slate rates over other roofing materials and over other quarry materials created an absurd situation. This was due, as the testimony of the slate producers shows, to the fact that previously, because of conditions within the industry, it "never took any concerted action to obtain that to which it was entitled, but took whatever rates and classifications were handed to it without consultation or protest."

The injustices which resulted were recognized by the railroads, as the Commission's decision shows—"No justification for this disparity was offered"—and the continuation of the decision—"and carriers should promptly revise their rates on roofing slate to central territory so as to bring them into better accord with rates on other roofing materials"—indicates the victory for slate producers which was easily accomplished once they had agreed upon organized effort.

Other rock products industries have been reaping the benefits, to a greater or less degree, of organized effort for a number of years, but in most cases the possibilities have scarcely been touched. Many producers are still outside the organizations they should be supporting. Too often the individual producer is not broad-minded enough to see the ultimate benefits to be derived from the initial sacrifices necessary in entering unreservedly into the active support of an association.

It is a pity that all cannot see the light. It makes the work of association officials more difficult; it retards progress within the industry; but most of all it harms the man who fails to give his support, and his complete support, to the work of his association in promoting organized effort.

Neglect of Potential Millions of Small Lime Purchasers

How to market this product in small quantities—in the 10 and 25-pound bags—for household, garden and lawn uses

By Thomas V. Hendricks
Sales Manager, Adams Bag Co., Cleveland, Ohio

EVERY purchaser of a packet of garden seeds is a potential buyer of lime in small quantities. Every householder who owns, or transient dweller who rents, a place where there is a bit of lawn is a prospective lime buyer. Every housekeeper who guards the health and happiness of a family group by keeping sweet and clean the little nooks and crannies around a home that when neglected grow into disease breeders—the damp line around the cellar wall, the ground about the garbage pail and countless others—needs lime, and ought to be so familiar with it that she would readily order just as she does salt and sugar and coffee.

Every woman who putters around a litle flower bed ought to know the soil-corrective qualities of lime, if she does not already know it, and lime should be made so convenient for her to buy that she would put it on her weekly want list.

These great potential buyers of lime are being practically neglected today. Once they are educated to the use of lime and it is made easy for them to buy in small quantities, hundreds of thousands of tons will be added to the yearly lime consumption of America. Here and there a wise lime man has sensed the possibilities of the small package market, and is profiting thereby. Unfortunately, the great majority still look upon this vast field as too trivial to demand attention. Such is the penalty we pay for a too great concentration on the quantity field.

In reality, this small package field offers an exceptional opportunity for profit. The per pound price charged for the small package of lime can be vastly advanced over the per pound price when sold in quantities, and the added profit per hundred pounds will pay for all the advertising, packing, paper packages, trademarking, and other items that will enter into the marketing of lime in household packages.

Today these would-be purchasers of lime in small packages, even after they have been educated to the use of the product, get short shift from the dealer when they try to buy in amounts suited to their purposes. The woman who has a few flowers in the back yard, and has learned by experience, or has been told, of the value of a little lime spaded in around them at various times, doesn't want 50 or 100 lbs. of lime, yet often the dealer, who has been educated to the sale of lime in goodly quantities, insists upon a sale in the package of the size he has been accustomed to sell. The woman doesn't want that much, and she goes away empty handed.

Had the dealer been provided with packages of ten pounds of lime, put up in clean, white, well-branded bags, a sale would have been made, and a permanent buyer of lime created. Once accustomed to the use of lime, the average woman will buy and buy again. Her purchases in the aggregate would probably amount to a larger quantity of lime, during the season, than the original 50 or 100 lbs. that the dealer wished to sell.

The point is that women, who would be the principal buyers of the small package of lime, will not buy the larger package. It is too bulky for them to handle. It is messy and dusty after opened, and cannot be retied. They often have no place to keep it conveniently, and every reaction that they have toward the big packages is an unfavorable one.

A 10-lb. package, however, is familiar to every woman. She is constantly buying such packages in meal, and flour, sugar, salt and other commodities, and she instantly conjures up the spot on the pantry shelf, or in the cellar cupboard, where such a convenient package of lime would be at her finger tips.

If it is an open-mouth bag in which the lime is packed the appeal is doubly great. Years of familiarity with such packages has told her that when a needed amount of the contents has been taken out, the bag can be retied, and put back on the shelf ready for the next demand. These small open-mouth bags offer no packing difficulties to the manufacturer. They can be automatically filled and tightly sealed at the top by a simple, quick tying process with patent wire ties or ordinary jute twine. No fussy, dusty, dirty bag will do, if marketing is to be made easy. A clean, white enameled bag presents a surface from which siftings of dust slip off. A bright, well-printed brand allies the lime packed in this bag with the quality products in food and other lines that every day make their appeal to her by the brilliance of their packages. And the directions, printed on the back of the bag, are always before her, reminding her to use lime, and suggesting new uses for it.

From the standpoint of the dealer, an open-mouth bag of lime in small quantities offers exceptional retailing opportunities. A pile of lime sacks, each carrying an attractive brand and interesting directions and suggestions for the use of lime in vegetable and flower garden, stored invitingly near the box from which packets of seeds are being sold, would sell themselves. A mere suggestion on the part of the dealer—"and how many sacks of lime?"—would probably be all that would be necessary to close a majority of sales. At present the lime is kept in the back warehouse, in dusty gray sealed packages or in barrels, and the prospective buyer has nothing to suggest it to him. If he happens to remember that he wants lime, then, usually, he must buy more than he wants, fuss with an unwieldy package, or have a small quantity measured out with a scoop, too weak to insure safe delivery at his home.

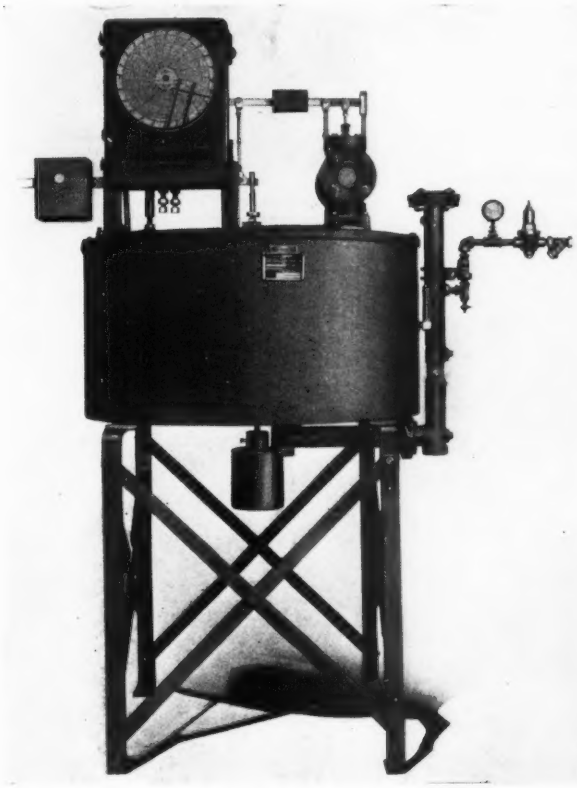
And what an opportunity this situation presents for an alert lime manufacturer to educate the people of America not to ask for lime, but for a certain brand of lime. There is no limit to the attractiveness of brands printed on white enameled bags, save the imagination of the artist that creates them, and a tremendous opportunity presents itself for the coining of a trade name, the preparation of a striking brand, and the burning of that brand into the consciousness of 100,000,000 people by advertising.

And when the price at which a ton of lime can be sold in the small unit is compared with the price that it brings in bulk, it must be apparent that such a campaign, once started, would finance itself, and still pay a profit to the promoter.

New Machinery and Equipment

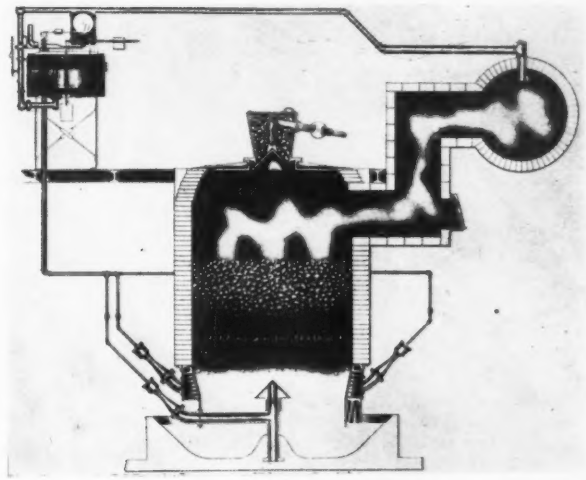
Blast-Controlling Device for Gas Producer

UPON the strength of its ability to put on the market an automatic controlling device to govern the blast of the gas producer, say the Chowning Regulator Corp., Corning, N. Y., they are offering the Chowning regulator as shown in the illustration.



At left—Regulator controlling gas generated in the producer.

Below — Showing method of using line pressure to regulate steam and air.



This regulator's function is to control the quantity of gas generated in the producer to meet the actual requirements. This is accomplished by regulating the quantity of steam admitted to the producer and maintaining uniform pressure in the gas main.

The regulator consists of a sheet steel, oil-tight holder enclosing a rigidly constructed floating diaphragm which, through a pair of connecting levers, actuates a balanced piston valve that controls the steam admitted to the blowers. The space beneath the diaphragm and the pipe that connects this space with the gas main contains compressed air at all times. Increased or decreased pressure of gas in the main reacts on the "air cushion," causing the diaphragm to raise or lower with a corresponding closing or opening of the steam valve.

Compressed air, being supplied continuously in a very small quantity, flows into the gas main through the connecting pipe and provides a means of keeping this pipe connection clean between the regulator and the gas main. This feature is vital to the continuous and successful operation of the regulator and is covered by letters patent.

The recorder permanently records the gas main pressure in inches of water and the steam blower pressure in pounds. Such records enable the operators, at any and all times, to note the condition under which the producers are working. They also serve as a check for the superintendent both for his operatives and the operation, since furnace reversals and all other operations involving time are indicated.

This regulator can be installed without change of present equipment with the exception of the steam piping and the addition of a pipe connection to the gas main or heater. The Chowning pressure regulator, claim the company, will maintain a supply of gas to the furnace not exceeding 1-10 in. water-column variation.

Pulverizer for Rock Products Industry

ALTHOUGH originally intended for the cement industry, say the manufacturers of the Bonnot pulverizer, the Bonnot Co., Canton, Ohio, this pulverizer is serving many plants, including grinding, lime, cement, phosphate rock, talc, etc.

The main frame is a one-piece casting, making a self-contained machine. Particular attention has been given to reducing the vibration. The base is taper-bored and lined with a removable steel bushing securely held in position. Outside, the grinding ring is machined to fit the taper in the steel bushing and drawn in place by two large clamp bolts extending through the base rear and easily accessible.

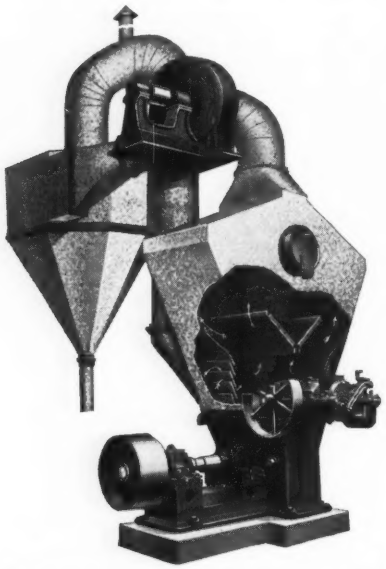
The main bearing, adjacent to the grinding chamber, is lined with bronze bushing and has both vertical and lateral adjustment. The thrust bearing on the drive end of the base has a series of collars to prevent end motion on the shaft, and end and side adjustment. The rolls can be lined up with the grinding ring by using this adjustment.

Grinding parts consist of the stationary track and the revolving head with its rolls. The track is held vertically in the main frame and the rolls revolve around the inner side of the ring, driven by the head, and are held against the ring by

centrifugal force. The wear is uniform on the entire surface.

An easily removable cover plate closes the grinding chamber. The driver, rolls, and ring, the only wearing parts in the chamber, can be conveniently removed without disturbing the shaft or other parts.

The track is made with the inner face concave to assist in holding up the material in the rolls path. This track is of tough steel. The driver is a one-piece casting, of special metal, recessed for each roll, with pockets corresponding to the shape of the roll and gudgeons. Between the rolls the driver is shaped to converge the material on the grinding ring in front of the roll where the grinding action takes place.



Pulverizer base, showing grinding chamber rolls, driver and removable cover

The rolls are of high-carbon steel forgings, thus giving a hard wearing surface. The short gudgeons lay in the pockets in the driver. The propelling force is applied by the driver to the gudgeons instead of the rolls perimeter, thus reducing the power required. No lubrication is required in the grinding chamber.

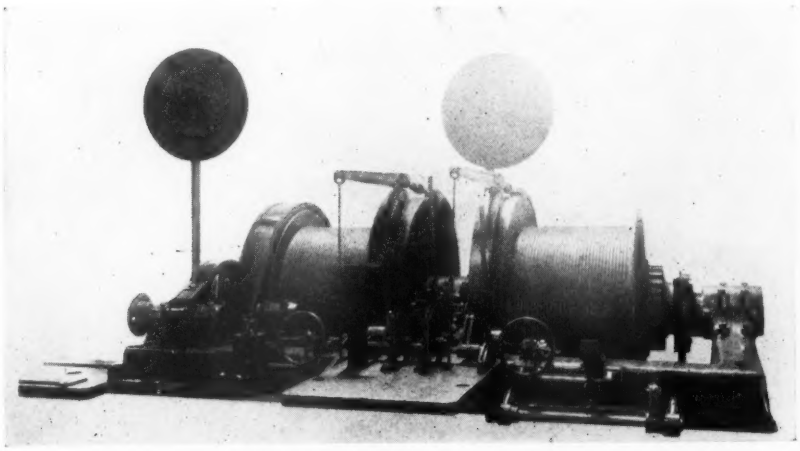
Attached to the top of the main frame is the separator base over the grinding chamber. The separator sides diverge to form a large chamber into which the material is thrown by the driver in a constant stream from the grinding zone. The material is deflected by the V-shaped baffle in the center of the separator, reducing the velocity and causing the material to cascade down the louvers, between which the air enters. This air current picks up the fine material and conveys it through the outlet pipe at the top, which discharges into the collector. The coarser material not lifted by the air returns to the grinding chamber by gravity until it is ground fine enough to be carried to the collector by the air.

The Bonnot collector is eight-sided, the faces breaking and changing the air current and reducing the velocity. This action causes the material in suspension to drop to the discharge pipe at the bottom.

Hoists Capable of Handling 10,000 Lb. of Material

THE Ottumwa Iron Works, Ottumwa, Iowa, has recently placed in the new crushing plant of the American Lime & Stone Co., Bellefonte, Pa., an electric hoist of the double reduction, double drum type with one rigid drum and one clutched drum, there being three bearings on the drum shaft.

This hoist is built for handling 10,000 lb. of material in a 6500-lb. skip, through a distance of 400 ft. of 56 deg. incline at 300 ft. per minute, using 1⅛-in. rope. The hoist operates in balance, one skip lowering, while the other skip and load is hoisting. The hoist has a 5-ft. drum hoist brake, is equipped with a Lilly safety governor and is driven by a 100-hp., 600-r.p.m., 2200-volt, 3-phase, 60-cycle motor.



Electric hoist installed at plant of American Lime and Stone Co., Bellefonte, Pa.

In this hoist the main frame is of the low girder type with the moving parts supported close to the foundation to increase the rigidity of the machine. It is made of cast iron with very large bearing surface on the foundation and of compact and neat appearance. The frame is held together by substantial tie pieces at the operator's end, the joints being machine finished, bolted and doweled together.

The drum shaft bearings are 10 in. in diameter, 20 in. long, and the middle bearings are 11 in. in diameter, 20 in. long. They are cast in one with the main frame and lined with best quality of babbitt metal. Proper provision is made for lubrication and adjustment. The intermediate shaft bearings, the ring oiling type, are 4½ in. in diameter, 15 in. long, cast separate and secured on faced pads.

The drum si of the straight cylindrical type, made of hard, close-grained cast iron of a special mixture, the shells being cast separately to avoid shrinkage strains and turned and grooved in a left-hand spiral for a 1⅛-in. rope. Each shell is supported by a main brake spider at one end and a heavy six-arm spider at the other. The latter spider in the case of the rigid drum is the main gear spider. The clutched drum spiders are bushed with removable bronze bushings. The drum shells are 60 in. in diameter, 48-in. face. One drum is driven by an internal gear clutch—a steel internal gear secured to the drum and a steel spur gear moving on two feathers in the main shaft, arranged to fit tooth for tooth in the internal gear. The sliding gear is operated by a hand lever and ratchet quadrant.

Each drum is equipped with heavy post brakes, lined with high quality friction wood. The posts are anchored to the foundation through wide foot bearings which make them substantial, rigid and positive in their action. The brakes are operated by hand lever and ratchet quadrant. The brake size is 84 in. in diameter and 8-in. face.

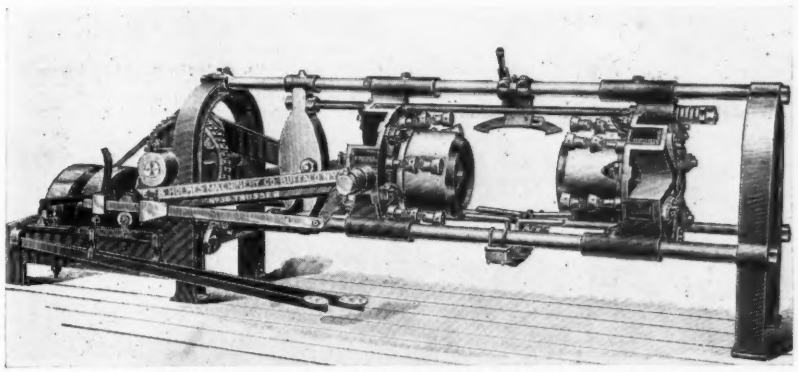
The hoists are also equipped with a 4-ft. dial indicator for each drum, driven by means of cut sprockets and block chains.

The gears are entirely protected by a steel gear guard. A low operating platform is provided on which the control levers are assembled.

Machine for Leveling and Driving Truss Hoops on Slack Barrels

THIS automatic machine, placed on the market by the E. & B. Holmes Co., Buffalo, N. Y., stops after trussing each package, or is continuous in its operation, leveling and trussing the barrels as rapidly as the operator can roll

them. It will do the work, announces the manufacturers, on packages from half to whole barrels by having the requisite number of cones. As the machine is fitted with cones for one size package, an extra set is necessary for each different size, for which an extra charge is made.



This machine levels and then drives the truss hoops on slack barrels on both ends at one time

The pulleys are 24 in. in diameter, with 7-in. face, and should make 350 r.p.m. The top of the pulley next to the machine should run toward the operator; the pulley top farthest from the machine should run from the operator. This machine drives the truss hoops on both ends of the package at the one time.

The net weight of the machine is 7000 lb.; it occupies a floor space of 3 ft. 9 in. x 14 ft. 10 in.; its cubic contents is 250 cu. ft.; the horse-power is 5, and it has a capacity of 6000 bbl.

Box Car Loader for Bulk Materials

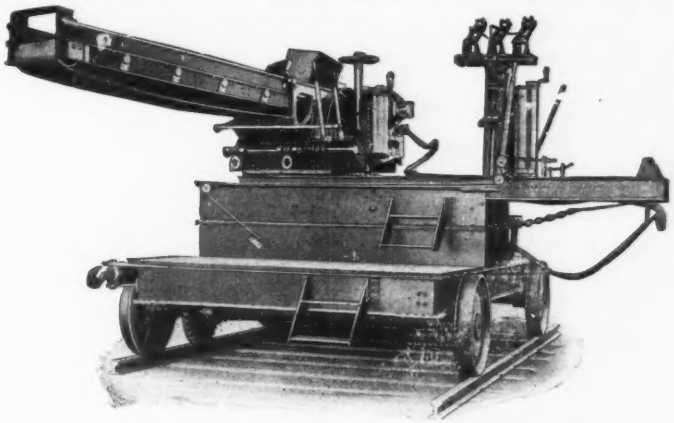
THE Ottumwa Box Car Loader Co., Ottumwa, Iowa, has on the market a type of box-car loader for which it asks special attention by those who have to do box-car loading.

This box-car loader is made with a steel belt for loading large bulk material or with a rubber belt conveyor for such material that will not cut a rubber belt. The steel belt box car loader and the rubber belt loader are practically identical in all dimensions and measurements, except for the difference in the conveyor belt itself and the driving pulleys or sprockets. Conveyor belt machines are operated by electric motors only. The rubber belt machines require from 11 to 15 hp. and the steel belt from 18 to 25.

Either model consists of a conveyor approximately 13 ft. long, mounted in a revolving and tilting frame, which in turn is mounted on an I-beam frame supported and carried on a set of rollers anchored on the foundation which is at the side of the loading track. This frame is propelled by power into and out of the box car.

The company finds that a belt 22 in. wide for both rubber and steel is the practical width. The wider belt would necessitate a shorter conveyor and a narrower belt would decrease the loading capacity.

Either the steel belt or rubber belt conveyor can be made portable by mounting the loader on a movable, self-propelling truck. The portable loader is used for loading from a series of bins, chutes or pockets, etc. The truck operates on an independent track which runs parallel to the loading track. It is self-propelled by an individual motor and is capable of not only doing the loading, but of switching either the loaded or empty cars.



Full portable conveyor rubber belt box car loader

The loaders are mechanically and power driven. In loading a box car proper, the Ottumwa belt conveyor loader has three distinct movements, namely: Conveyor moving from center toward the end of the car, moving also from side to side of car and elevating or lowering the end of the conveyor, which makes it possible to actually place the coal in any desired position in the car. With this combination, throwing, crushing and grinding are eliminated.

The following features are claimed to be distinctive and exclusive by the company: The loader is entirely mechanical and power driven, moves into and out of the car by power, and the conveyor can be moved by power from one end of the car to the other and stopped at any intermediate point. This conveyor or loader loads both ends of the car without having to remove the loader or stop the flow of the material. The loading can be done from either door as the conveyor loader stands squarely in the center of the car, thus permitting the material to be taken from either side of the car. An equal distribution of material is made possible for the reason that the conveyor stands squarely in the center of the car. With such a loader, in order to load material over to the opposite side of the car, it is necessary to turn the conveyor at an extreme angle. This greatly shortens the distance the conveyor extends into the end. By having the base in the center of the car, when loading to either side, the angle the conveyor is turned is so small that practically no carrying distance is lost.

Thus a conveyor loader whose belt reverses and runs in either direction—the conveyor does not have to be taken out of the car and turned around to load the opposite end. Less breakage will result from loading, which is especially important when loading bulk lime. By the combination of the three different conveyor movements it is possible to carefully place the lime in practically any desired position in the car. The operator never leaves the levers and controllers, as all movements are mechanical and power driven and all controllers at one central point.

The design of the steel belt used on the steel belt loader is a scientific development and is said to be extremely efficient. The belt not only constitutes the conveyor but also the chain drive itself. The design is such that the under side of the belt forms the driving surface. The sprockets used for driving this belt are practically the same width as the belt itself. Thus, the belt is driven across its entire width and not at one or two points. This adds to the life of the belt and prevents slipping.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.00	.....	1.50	1.25	1.25	1.25
Coldwater, N. Y.		1.50 per net ton all sizes; fluxing stone 1.80 per ton				
Eastern Penna.	1.10	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	1.00	1.15	1.15	1.15	1.15	1.15
Prospect, N. Y.	1.00	1.25	1.25	1.25	1.25	.....
Walford, Pa.	.....	1.30	.....	.....	1.30	.....
Western New York	1.00	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	2.00	.....	1.50	1.35	1.35	.....
Buffalo, Iowa	1.00	.....	1.15	.95	1.00	1.00
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.	.....	.....	.....	.....	1.75	.....
Greencastle, Ind.	1.25	1.10	1.10	.90	.90	.90
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.40	1.20	1.35	1.20	1.20	1.20
Lannon, Wis.	.80	.....	.90	.....	.80	.80
Mitchell, Ind.	.90	.....	.....	.....	.....	.....
Montreal, Canada	.85	1.20	1.10	1.05	1.00	.....
Montrose, Ia.	1.25	1.55	1.65	1.55	1.50	.....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.05	1.10	1.05	1.05	1.00	.....
Southern Illinois	1.40	1.30	1.40	1.40	1.40	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.25	1.35	.....	.....
Stone City, Iowa	.....	.....	1.40	1.30	1.25	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
			Prices include 90c freight			
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Waukesha, Wis.			all sizes 1.10 per ton			
SOUTHERN:						
Alderson, W. Va.	1.10	1.35	1.65	1.35	1.35	.....
Bromide, Okla.	1.50	.....	.....	1.50	1.50	.....
Cartersville, Ga.	.....	2.00	2.00	1.40	1.40	1.40
Chickamauga, Tenn.	.90	1.00	1.00	1.00	.90	.....
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Gainesville, Ga.	1.00	1.25	1.25	1.25	1.25	1.25
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	2.00	2.00	2.00	1.50	1.50	1.50
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shephard, Tenn.	1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.....
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.60	1.50	1.25	1.15	1.00	.....
Bound Brook, N. J.	1.80	2.30	1.90	1.50	1.40	.....
Dresser Jct., Wis.	1.25	2.25	2.25	2.00	1.50	1.50
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.30@1.40	1.30@1.40
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	.....
Eastern Mass.	.60	1.85	1.60	1.50	1.50	1.50
Eastern New York	.75	1.60	1.60	1.40	1.40	1.40
Eastern Penna.	1.25	1.65	1.50	1.40	1.30	1.30
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50	1.25	1.15	1.00	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*	.....	1.75*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	1.75	2.10	1.80	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Columbia, S. C.—Granite	.....	.....	1.75@2.00	1.75	1.60@1.75	.....
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	.85	1.60	1.50	1.35	1.35	1.35
Eastern Penna.—Quartzite	.90	1.35	1.20	1.20	1.30	1.30
Ft. Springs, W. Va.—Granite	1.00	1.25	1.40	1.25	1.20	.....
Lithonia, Ga.—Granite	1.00	1.50	1.50	1.15	.....	1.15
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Los Angeles, Cal.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	1.25@1.90
Middlebrook, Mo.—Granite	3.00@3.50	4.00@5.00	.....	2.00	.....	1.25
Sioux Falls, S. D.—Granite	.75	1.85	1.75	1.70	1.70	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—Raw ground; sacks, 4.50; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.00; bulk 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Osborne, Pa.—45% thru 200 mesh, 60% 100 mesh, 100% thru 20 mesh; 4.50 sacks; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk..... 3.00

Williamsport, Pa. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—50% thru 50 mesh; paper, 4.75; bulk..... 3.75

CENTRAL:

Alton, Ill. — Analysis, 98% $CaCO_3$, 0.3% $MgCO_3$—90% thru 100 mesh..... 4.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.25

Bettendorf, Ia., and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh..... 1.50

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$ (90% thru 50 mesh, 2.00), 50% thru 4 mesh..... 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.40

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$—50% thru 52 mesh, 50% thru 59 mesh, 100% thru 10 mesh; bags, 4.50; bulk..... 3.00

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—40.8% thru 100 mesh, 61.2% thru 50 mesh..... 1.40@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$—pulverized limestone 1.50

Montrose, Ia.—90% thru 100 mesh..... 1.25

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—100% thru 10; 80% thru 50; 70% thru 100..... 3.25@5.00
99% thru 10; 55% thru 50; 40% thru 100 ..... 1.75@2.00

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ¼-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 30 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh	1.50
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh.... 90% thru 50 mesh	5.00 1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk	4.25
SOUTHERN:	
Alderson, W. Va.—90% thru 50 mesh	1.50
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk	4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh	4.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh 90% thru 4 mesh	2.00 1.50
Cartersville, Ga.—Analysis, 55% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh	2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh	2.75
Ft. Springs, W. Va. — 50% thru 100 mesh	3.00
Hot Springs, N. C.—90% thru 100 mesh, sacks, 4.25; bulk	3.00
Knoxville Tenn.—Pulverized 90% thru 100 mesh 100% thru 10 mesh	2.50 2.70 2.25
Ladds, Ga.—90% thru 50 mesh	2.00
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk	3.00
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks	5.00
WESTERN:	
Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk	4.00
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh	.50
Kansas City, Mo. Corrigan Sid'g—50% thru 100 mesh; bulk	1.80
Terminous, Calif. — Analysis, 97.3% $CaCO_3$, .04% $MgCO_3$—65% thru 200 mesh, 90% thru 100 mesh, 95% thru 80 mesh, 100% thru 50 mesh; sacks, 5.00; bulk	4.50
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:	
Baltimore, Md.	2.25
Berkley Springs, W. Va.	1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.	5.00@8.00
Columbus, Ohio—Glass sand	1.25
Dunbar, Pa.—Damp	2.00
Falls Creek, Pa.	2.50
Hancock, Md.—Damp	1.25@1.75
Klondike and Pacific, Mo.	1.75@2.50
Mapleton, Pa.	2.25@2.50
Massillon, Ohio	3.00
Millington, Ill.	1.75
Mineral Ridge, O.	2.50
Green	2.25
Montoursville, Pa.	1.75
Oregon, Ill.—Glass sand	.75
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Rockwood, Mich.	2.50@2.75
Round Top, Md.—Dry	1.25
San Francisco, Cal.	3.00@3.50
St. Mary's Pa.—Unwashed	2.00
Thayers, Pa.	2.00@2.50
Utica, Ill.	1.00@1.25
Zanesville, Ohio	2.00@2.50
FOUNDRY SAND:	
Albany, N. Y.—Sand blast	4.00
Molding fine and brass molding	2.00
Molding coarse	1.75
Allentown, Pa.—Core and molding fine	1.50@1.75
Arenzville, Ill.—Molding fine	1.40
Beach City, O. — Core, washed and screened	2.00@2.50
Furnace lining	2.50@3.00
Molding fine and coarse	2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse	5.00
Sand blast	5.00@8.00
Stone sawing	6.00
Cleveland, O.—Molding coarse	1.50@2.00
Brass molding	1.50@2.00
Molding fine	1.50@2.25
Core	1.25@1.50
Columbus, O.—Core	.30@1.75
Sand blast	3.50@5.00
Furnace Lining	1.50
Molding fine	2.00
Molding coarse	1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.60	.60	.60
Ambridge and So. Heights, Pa.		1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
Erie, Pa.	1.00		1.00		1.25	
Farmingdale, N. J.	.48	.48	1.00	1.00	1.20	
Hartford, Conn.	.90		1.25	1.15	1.15	1.1
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Ludlow, Mass.	.75*	.75*	1.70		1.50*	1.50*
Machias, N. Y.	.95	.95	.85	.85	.85	.85
Philadelphia, Pa.	.75	.75		1.40	1.25	
Pittsburgh, Pa.	1.15	1.15	1.15	1.15	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		1.00		Pure white sand,	1.50	
Washington, D. C.	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.40	.40				.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Ia.	.50	.40	1.50	1.50	1.50	1.50
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.40	.40	1.25	1.00		.90
Elkhart Lake, Wis.	.60	.54	.70	.68	.68	.60
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Greenville, Mechanicsburg, O.	.65	.65	.65	.65	.65	.65
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.		.40			.80	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Le Mars, and Doon, Ia.		.90		1.80		
Libertyville, Ill.		.50		.70		
Mankato, Minn.—Pit Run	.50	.40	.40			1.25
Mason City, Ia.	.65	.55	1.80	1.70	1.60	1.55
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.25	1.25	1.25	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Riton, Wis.		.40			.60	
St. Louis, Mo., f. o. b. cars	1.10	1.30	1.50	1.30		1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65	.65	.65	.75	.75	.75
Terre Haute, Ind.	.60	.60	.60	.75	.60	.60
Waukesha, Wis.	.60		All other sizes, .70 per ton			
Winona, Minn.	.50	.40	1.00	1.25	1.00	1.00
Yorkville and Moronts, Ill.	.80	.60@ .80	.60@ .80	.60@ .80	.60@ .70	.60
SOUTHERN:						
Alexandria, La.		.70			1.20@1.35	
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.		1.45	1.50	1.50	1.50	1.50
Estelle Springs, Tenn.	1.15	1.00	1.00	1.00	.85	.65
Ft. Worth, Tex.		2.00		2.00		2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.75	1.50	1.50	1.50
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.		1.00		1.20		.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	1.20	.90	Washed gravel, all sizes, 2.25			
Roseland, La.		.25	.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Jedburg, Mo.	.70	1.20	.95	.75	.75	.70
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Los Angeles, Calif.		.75	1.25	1.25	1.15	1.15
Niles, Calif.	1.00	1.00	1.40	1.00	1.00	1.00
Pueblo, Colo.	1.10*	.90*		1.25*	1.50*	1.50*
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	2.00*	1.25*		1.50*
Yutan, Neb.	.40		Bank run .40			

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Ia.			.80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)		1.00		.95		
East Hartford, Conn.			.65 per cu. yd.			
Estelle Springs, Tenn.						.85
Fishers, N. Y.	.50@ .75			.50		
Hamilton, O.			.40 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.30		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex.		.95				.60
Janesville, Wis.		.65			.65@ .75	
Oxford, Mich.				.65	.65	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.40			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.			Clean pit run .50@.60			
York, Pa.		.95@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.25	1.15	1.10	1.10
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.90	.90	.90
Erie, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65. F. O. B. Detroit				
Ironton, O.	2.05		Other grades 1.45				
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	(Any delivery in city except team track deliveries) 1.30	1.50	1.30	1.30	1.30	1.30
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.00	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.			7.00					3.50
Bellefonte, Pa.			8.00	9.00	8.00		7.00	
Berkley, R. I.			12.00					2.30
Buffalo, N. Y.		11.00	11.00	11.00			9.50	2.00*
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
Paxtang and LeMoyne, Pa.					5.00		4.75@5.00	
Union Bridge, Md.			13.00		5.50			
West Rutland, Vt.	13.50@14.00	11.00@11.50	11.00@11.50	13.50	10.00		11.00	3.50
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25					
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50	10.50	10.50		7.50	1.65*
CENTRAL:								
Delaware, Ohio	10.50	9.00	8.00	10.00			8.00	1.50
Geneo, Ohio	10.50§							
Gibsonburg, Ohio	10.50§	9.00	8.50		7.25	9.25	8.00	
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70*
Knowles and Valders, Wis.			12.50		5.00	9.00		
Luckey, Ohio	10.50	9.00	8.00				8.00	
Marblehead, Ohio		9.00	8.50				8.00	1.50*
Mitchell, Ind.		11.00	11.00	11.00	9.50		8.50	1.45
Sheboygan, Wis.					5.50	8.50		
White Rock, Ohio	10.50				7.25	9.25		
Woodville, O. (dlrs.' price)	10.50a	9.00a	8.00a	10.00a	7.25		8.00	1.50
SOUTHERN:								
El Paso, Tex.							12.50	
Karo, Va.							7.00	1.30
Knoxville, Tenn.	22.00	9.50@11.00	9.50	9.50	8.00	9.50	7.50	1.30
Ocala and Zuber, Fla.	12.00				11.00	10.00		1.50
Sherwood, Tenn	11.00	9.50			7.50		7.50	
Staunton, Va.					8.00		9.50b	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. Mex.							12.50	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl.

Miscellaneous Sands

(Continued from preceding page)

Stone sawing	1.25
Traction	.75
Brass molding	2.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core and traction	1.00
Molding, fine and coarse	1.25
Brass molding	1.50
Dunbar, Pa.—Traction, damp	2.00
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.25
Sand blast	2.50@3.75
Traction sand	.40
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	3.00
Traction	1.75
Franklin, Pa.—Core	1.00@1.75
Furnace lining	2.25
Molding fine	2.00
Molding coarse	1.75
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.20@1.40
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and looting clay	.60@ .80
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run)	1.75
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.00
Mapleton, Pa.—Glass sand, core, furnace lining, molding fine and coarse; dry, 2.50; damp	2.00
Massillon, O.—Traction, molding fine and coarse, furnace lining, core	2.50
Michigan City, Ind.—Core, traction	.30@ .40
Mineral Ridge, Ohio—Core	1.75@2.00
Furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding	1.75
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Brass molding	.40
New Lexington, O.—Molding fine	2.00
Molding coarse	1.75
Oregon, Ill.—Core, furnace lining, molding fine and coarse, traction	.75
Brass molding	.75
Sand blast	3.00
Ottawa, Ill.—Core, molding coarse (crude silica sand)	.75@1.00
Furnace lining	.70@ .85
Ottawa, Minn.—All crude silica sand	.75@1.25
Pelzer, S. C.—Glass sand (carload lots only)	.70
Rockwood, Mich.—Core, damp	2.00
Roofing	2.75
Sand blast	3.75

Miscellaneous Sands

(Continued)

Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@3.50
Direct from pit.	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core	1.75
Furnace lining	1.25
Molding fine and coarse	1.25
Traction	1.75
Utica, Ill.—Core	.75@1.00
Furnace lining	1.00
Molding fine and coarse	.60
Sand blast	2.50
Stone sawing	1.00
Traction and brass molding	1.00@1.25
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.50) dry	2.00
Traction (dry)	2.00
Zanesville, Ohio—Brass molding and molding fine	1.35@1.75
Molding coarse	1.35@1.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude Talc	3.50
Ground talc (20-50 mesh), bags	10.00
Cubes	50.00
Blanks, per lb.	.07
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh), including bags	8.25@10.00
Emeryville, N. Y.—150-200 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh)	13.50@15.50
200 mesh)	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@3.50
Ground talc (20-50 mesh)	5.75
(150-200 mesh) bags	8.75@11.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50 (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 Mesh)	20.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50
(Bags $1.00 extra)	
Ground talc (150-200 mesh), bulk	9.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	4.00@5.00
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	6.50
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla.—Analysis, 50% to 65% B.P.L.	3.50@6.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

Ground Rock

Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 65 to 70%	5.00@6.50

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	6.00@ 7.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	20.00	9.00@14.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	28.50@30.00	20.00@22.50
Milwaukee, Wis.		30.00
New York, N. Y.—Red and yellow Verona		32.00
Phillipsb'g, N. J.—Green stucco dash		9.00@14.00
Piqua, O.—Marble		7.00@ 9.00
Poultney, Vt. — Roofing granules		3.75
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	12.00	14.00
Wausau, Wis.	14.00@18.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@32.00
Bellows Falls, Vt.	18.00	25.00
Birmingham, Ala.	13.50	25.00@35.00
Bridgeport, Conn.	31.00	32.00
Carpenterville, N. J.	16.00	32.00@65.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	22.50@25.00	50.00@75.00
Rochester, N. Y.	21.00	
Friesland, Wis.	20.00	
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	20.00	30.00@40.00
Piqua, O.	15.00	25.00
Phoenix, Ariz.	16.00	35.00@80.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	35.00@85.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00@30.00	35.00@75.00
Salt Lake City, Utah	18.00	35.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	20.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	13.00@14.00	26.00@65.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	8.50
Boston, Mass.	12.00@13.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	13.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	12.50
Michigan City, Ind.	10.00
Milwaukee, Wis.	12.00@12.50
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	16.00
Washington, D. C.	13.50
Winnipeg, Can.	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Ia.	2.31
Cincinnati, Ohio	2.45
Cleveland, Ohio	2.36
Chicago, Ill.	2.07
Dallas, Tex.	2.25
Davenport, Ia.	2.24
Denver, Colo.	2.69
Detroit, Mich.	2.37
Duluth, Minn.	2.04
Indianapolis, Ind.	2.31
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.20
Milwaukee, Wis.	2.26
Minneapolis, Minn.	2.34
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Pittsburgh, Pa.	2.12
Portland, Ore.	3.05
St. Louis, Mo.	2.10
San Francisco, Calif.	2.63
St. Paul, Minn.	2.34
Toledo, Ohio	2.39
Seattle, Wash.	2.94

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	½x32x36" Weight 1500 lbs. Per M Sq. Ft.	⅜x32x36" Weight 1850 lbs. Per M Sq. Ft.	Wallboard, ⅜x32 or 48", Lengths 6'-10', 1850 lbs. Per M Sq. Ft.
Douglas, Ariz.	.....	.....	6.00	13.00	.....	10.50@12.00	.....	.....	.....	11.50@13.50	.....	.....	.....
Fort Dodge, Ia.	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	.....	.....	.....
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	4.00	6.00	9.00	9.00	9.00	.....	.....	27.75	21.00	19.38	20.00	30.00
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Winnipeg, Man.	5.50	5.50	7.00	15.00	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

Accident Prevention

How to Avoid Yard Accidents—Part III

THIS installment concludes the very instructive series of articles on how to avoid accidents in the yard, contained in ROCK PRODUCTS for May 20 and June 3.

Care of Yard Tools

Shovels, picks, sledges, cold-chisels and various other tools used in yard work are often slighted in inspection service and become badly in need of repair. A special tool-room for yard tools should be provided, and all tools turned in at the close of each day or shift. Before the tools are again put into use the toolman should see that they are in a good state of repair. The handles of all sledges, picks, hammers, shovels and other tools should be properly fitted and carefully maintained. Cold-chisels and other tools with burned heads should be redressed. With proper care, accidents resulting from defective tools will be largely eliminated.

Signs

The intelligent use of warning signs is an important phase of accident prevention in yards. The signs should be of enameled steel or covered with glass to protect them from the weather. Signs should be kept clean and readable; weather-beaten and smoke or dust-begrimed signs are of little value. Danger signs should be used in any place where unusual danger exists or where the danger is not apparent.

The Universal Danger Emblem compels notice and is very effective when combined with a terse statement of the danger. It is coming into general use and thousands of workmen now realize that danger exists where this emblem is seen.

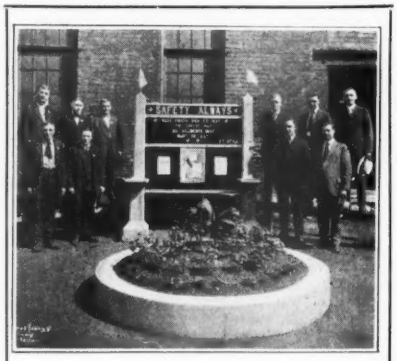
Lighting the Yard

Adequate light will materially reduce the number of accidents occurring in yards and buildings. Many industrial plants find it necessary to operate night gangs and for this reason the proper lighting of the yards should not be overlooked. As a rule, yards are less likely to be properly lighted than are other departments and therefore many serious and fatal accidents have occurred. Sufficient light should be provided at all plant gates, railroad crossings, bins where unloading operations are carried on, and at all entrances to buildings.

Why He Is Interested in Safety

"YEARS AGO" said the head of a prominent industrial concern, "the attitude of management in practically all industries, was that if a workman was hurt it was his misfortune, not ours. In more recent years, however, employers and managers have come to realize that they are morally obligated to provide safe working places and safe working conditions. I am personally interested in safety because I feel that this moral obligation rests on me personally as much as it does upon our managers, superintendents, and foremen."

It is a great truth that just as the head, the directing power of a concern, is concerned in the safety of his employes, so will this care sift down to the meanest in the employ of the company. Heads of companies today are giving the subject of safety and sanitary conditions more and more thought and time than ever before, and their work is beginning to show results.



One of the illustrations from the pamphlet "Safety Bulletins and Bulletin Boards"

As Interesting as a Newspaper

Shop Bulletin Boards can be made as interesting as the daily newspaper. Just as the press molds public opinion in questions of public interest, so the shop bulletin board determines workers' opinions with reference to safety. To secure maximum results from shop bulletin boards, however, it is necessary to know:

1. What types of bulletin boards are best.
2. What ones to buy—or how to make them in your own plant.
3. Where they should be located.
4. What bulletins are the most effective.
5. How often the bulletins should be changed, etc.

All these and many other questions are answered in the National Safety Council's pamphlet on "Safety Bulletins and Bulletin Boards." If you are interested in preventing accidents to your workers you should not fail to read it. Other companies following the methods outlined therein have reduced accidents 25, 50, and even 80 per cent.

A copy of the pamphlet and sample safety bulletins will be sent free on request.

National Safety Council
Non-Commercial Dept. R Not-for-Profit
168 N. Michigan Ave., Chicago

Should the Careless Be Discharged?

THIS question is asked by David S. Beyer, vice-president of the National Safety Council, and then he answers it himself. The careless employe should be discharged only after every method has failed to make him careful.

The safety problem of the foreman or other executive is to take the best human material that he can get, and smooth out the individual kinks and imperfections himself until he makes good safety stock out of common, careless humanity.

If the employe in the end proves that he is careless beyond remedy, then he should be gotten rid of.

Educational Methods the Missing Link

"IN our plant," says a safety inspector, "we have an average of 300 men employed all the time. Our machinery is completely guarded with angle iron and wire mesh screen enclosures—guarded as well as, if not better than, any other plant in the state. Still we have had accidents.

"Up to the end of September, 1921, we averaged 14 accidents a month and in one month had no less than 29 accidents. On the first of October we inaugurated an educational campaign by writing individual letters to each employe calling his attention to the need of carefulness and posting large bulletins in conspicuous places throughout the plant. During October we reduced our accident record to five.

"Beginning on the first of November we had large bulletins printed with the heading 'No Accidents in November' in four-inch letters and with a different slogan every day. Every morning 25 of these bulletins were posted on bulletin boards in conspicuous places throughout the plant. We also printed a large calendar for November, the upper part being divided into spaces naming the different departments in the plant. The days in which there were no accidents were crossed out.

"We have kept up this system during December and I am glad to say that during those two months we did not have a single lost-time accident."

News of All the Industry

Incorporations

The Speers Sand and Clay Works, Philadelphia, Pa., has been incorporated for $300,000.

The Lenawee Sand and Gravel Co., Tecumseh, Mich., has been incorporated for $125,000.

The Pennsylvania Rock Products Co., Philadelphia, Pa., has been incorporated for $400,000.

The Typo Sand and Gravel Co., Typo, Ky., has been incorporated by H. H. Braden, G. S. Greer and J. D. Kries.

The Ashland Granite Co., Ashland, Wash., has been incorporated for $100,000 by E. V. Carter, J. P. Wolf and H. H. Elhart.

The Phillips Sand and Gravel Co., has been incorporated at Seattle, Wash., for $25,000 by S. A. Phillips and L. R. Savage.

The Hercules Silica Asphalt Corp., Nashville, Tenn., has been incorporated for $1,000,000 by D. M. Brumbaugh and W. B. Evans.

The New Hope Gravel Co., Columbus, Miss., has been incorporated for $100,000 by F. Nelson, Jr., W. M. Rucker and H. M. Beard.

The Kentucky Sand Co. has been incorporated in Newport, Ky., with a capital of $60,000 by F. E. Hall, D. P. Hall and C. S. Hall.

The Wayne County Sand and Gravel Co., Detroit, Mich., has been incorporated for $5,000 by John Porter, Howard Porter and R. Stotesburg.

The Barre Granite and Quarry Co., Montpelier, Vt., has been incorporated for $50,000 by E. L. White, J. Murphy, J. J. Clark and A. M. Cella.

Oral, S. D.—The gravel pits owned by Reitz and Crites will install a 200-ft. conveyor system of loading, and expect to be able to load 20 cars per day.

The Rock Ridge Sand Corp., has been incorporated at Wilmington, Del., for $240,000 by F. Lydic, D. C. Laing, and J W. Laing of Colport, Pa.

The Atlantic Sand and Gravel Co., Lynn, Mass., has been incorporated for $10,000 by J. N. Robbins, Lynn, and P. G. Johnson and H. M. Johnson, Saugus.

The Concho Washed Sand Co., Oklahoma City, Okla., has been incorporated for $10,000 by M. C. Hess, H. D. Bland, and De L. M. Bland, all of Oklahoma City.

The Bedford Nugent Sand and Gravel Co., Evansville, Ind., has made a request to the board of engineers of the War Department to lease two government barges.

The Standard Material Co., Minneapolis, Minn., incorporated at $150,000, has leased 100 acres of coarse aggregate gravel on the Great Northern and exploitation of the pits will begin at once. Officers are M. Bullis, president, and J. A. Nelson, vice-president.

The Granite Rock Co., Watsonville, Calif., is constructing an unloading pit on a spur in the Southern Pacific local yards, with an unloading capacity of about three car loads. From the pit the material will be carried by a bucket conveyor to four bunkers.

Sand and Gravel

The Acme Sand Co., Eustis, Ala., has been incorporated for $50,000.

The Henderson Sand and Gravel Co., Evansville, Ind., has added to its fleet another towboat. The new boat is 125 ft. long with 25-ft. beam.

The Winnipeg Sand and Gravel Co., Ltd., Winnipeg, Ont., has been incorporated for $150,000 to deal in sand, gravel and stone.

The Standard Material Co., 936 Plymouth building, Minneapolis, Minn., will establish a $100,000 gravel plant one mile north of Hopkins. John A. Nelson is president.

The Phillips Sand and Gravel Co. has been incorporated for $25,000 at Seattle, Wash. S. A. Phillips, formerly associated with the Pioneer Sand and Gravel Co., is president.

The Huntington Gravel and Stone Co., Huntington, Ind., has been incorporated for $50,000 to deal in wholesale and retail sand and gravel. Incorporators are R. N. Sampson, G. S. Morris and T. Anson.

The Sac River Sand and Gravel Co., Osceola, Mo., has opened its newly constructed plant and is busy with a large number of contracts, some of which are for roads throughout the northeastern part of the state.

The Midwest Gravel Co., near Arkansas City, Kans., has erected a $50,000 plant combining the latest equipment to produce sand and gravel. J. L. McQueen, mining engineer, is the promoter and O. N. Miller is superintendent of the plant.

Cement

The National Portland Cement Co., is erecting a plant at Coldwater, Mich., and plans to have it in operation Jan. 1.

The Knickerbocker Cement Co's plant at Hudson, N. Y., which has been closed for a considerable time, has reopened and is running full time.

The Cowell Portland Cement Co., Cowell, Calif., has a contract for 900 carloads of Mt. Diablo cement from builders in the bay district and is operating its 8 kilns on a 24-hour run.

The Fort Scott Cement Co., Fort Scott, Kans., expects to reopen its kilns, closed during the war, and produce lime in addition to cement. The owners are D. P. Thomas and H. M. Thomas.

The Hermitage Portland Cement Co., Chattanooga, Tenn., is planning to remodel the Old Hickory powder plant at Nashville, Tenn., at a cost of $1,500,000, into a 2000-bbl. cement plant. John C. Vance is president.

The Bessemer Limestone and Cement Co., Youngstown, Ohio, shipped over 100,000 bbl. in May, its best record this year to date. It has a capacity for shipments up to 150,000 bbl. monthly and expects to move in excess of 1,000,000 bbl. this year.

The Superior Portland Cement Co's plant at Concrete, Wash., has been increased by an expenditure of nearly $300,000 on improvements; it is capable of producing 3500 bbl. of cement on the raw side and 5000 bbl. on the finished side per day. The company is now adding a new packing house with a capacity of 7000 bbl. The plant is running full time, employing 300 men.

Phosphate Rock

The U. S. Export Phosphate Co., has been incorporated at Wilmington, Del., for $1,750,000.

Tampa, Fla.—W. L. Block reports that 13,400 tons of phosphate has been sold for export to Denmark and Spain.

The Atlantic Coast Lime railroad has completed a new phosphate elevator believed to be the largest in the country. It has a capacity of 400 tons per hour.

Starke, Fla.—Some of the phosphate mines in the Ft. Meade section are taking on more men, and allowing their part-time men to work full time. Other phosphate mines in this section will start operations soon.

San Francisco, Calif.—The directors of the Santa Cruz Portland Cement Co. have definitely decided to dismantle its plant at Napa Junction. The machinery will be shipped to Santa Cruz where the company is now operating.

Quarries

The Hiner Rock Asphalt Co., Lima, Ohio, has been incorporated for $50,000 by E. W. Hiner and A. L. Metheany.

The Western Materials Co., which has a magnesite plant at Valley, Wash., plans erecting a $30,000 plant in Hillyard, Wash.

The Le Roy Lime and Crushed Stone Corp., Le Roy, N. Y., is planning the installation of new crushing, grinding, drilling and other equipment. J. L. Heimlich is in charge.

The Ontario Marble Co., Ltd., Petersborough, Ont., has been incorporated at $200,000 to carry on the business of quarrying and manufacturing marble, granite and limestone.

Sioux Falls, S. D.—The Spencer Rock Quarry, Spencer, S. D., has received a contract to furnish crushed rock for facing pavements at Aberdeen. The contract calls for 30 carloads.

The Ohio and Indiana Stone Quarry, Greencastle, Ind., recently fired 15,000 lb. of dynamite in one shot and moved about 44,000 tons of stone. Thirty-six holes were drilled to a depth of 75 ft.

The Vendor Slate Co. of Vermont, Inc., Poultney, Vt., has been incorporated for $100,000 to quarry and manufacture slate products. Incorporators are C. D. Shanks, R. Griffith, Fair Haven, and J. R. Shanks, Poultney.

The Weldon Springs Quarry Co., Weldon Springs, Col., has been incorporated for $100,000 and will operate a crushed rock and lime plant. The plant will have a capacity of 20 cars crushed rock and 5 cars lime fertilizer per day.

York, Pa.—George J. Miller, Fred R. Williams and Cora Proctor of Delta have formed a corporation with a capital of $1,500,000 for the purpose of working the Proctor quarry for manufacturing slate and slate products. Miss Proctor will be the resident manager.

The Consolidated Rock Asphalt Co., with headquarters at Louisville, Ky., has been incorporated for $1,000,000 and will engage in the manufacture of road surfacing material. M. M. Ford is president, W. G. Schamberger, vice president. Operations will begin in the near future.

The Gray Eagle Marble Mills Corp., recently incorporated at Knoxville, Tenn., plan the erection of a $75,000 mill to manufacture marble for interior decoration. The mill will be operated in connection with the Gray Eagle Marble quarries, which is owned and operated by a separate corporation.

The Canada Crushed Stone Co., Dundas, Ont., recently suffered a $350,000 loss by fire. A newly built loading viaduct was completely destroyed. J. C. Buckbee of Chicago has been called in to consult on reconstruction of the burned portion of the plant. In the meantime a locomotive crane has been installed. Work on a new loading plant is under way. Four new 60-in. revolving screens and four 7x12 double-decked shaking screens will be installed. New conveying machinery will be purchased.

Dealers

The Murphy Coal and Wood Co., Peabody, Mass., has been incorporated for $20,000 to deal in fuel, cement, etc., by E. W. Budgell, J. F. McHugh and R. S. Roberts.

The Vienna Supply Co. has been incorporated in Vienna, Va., with a capital of $10,000 to handle building supplies. Jos. Berry is president and J. W. Irving is secretary.

The Central Silica Co., Ottawa, Ill., has been incorporated for $20,000 to mine and deal in silica sand, by-products, etc., by A. H. Hall, E. B. Wilkinson and R. I. Thornton.

The Central Illinois Sand, Gravel and Coal Co., Peoria, Ill., has been incorporated for $50,000 by A. Henry, Julia Henry, Louise Godi, H. Godi and C. M. Hendrickson to deal in building materials, etc.

The Decatur Sand and Gravel Co., Decatur, Ill., has been incorporated for $150,000 to mine and deal in sand, building materials, etc., by H. M. McMillin, J. H. Donnaldson, F. Kincaid and W. F. Montgoberg.

Lime

The Lime Products Co., Ltd., Montreal, has been incorporated for $250,000 to manufacture and deal in lime.

The Kittanning Limestone Co., Kittanning, Pa., has demolished its old bins and will erect four large new concrete bins to replace the old ones.

The Roaring Springs Marl Lime Co., Gloucester, Va., is planning for the installation of hoisting engines and other equipment at its property. R. J. Janney is general manager.

The Penn Lime and Stone Co., Rheems, Pa., delivered by truck 2,000 tons of crushed stone in addition to 2 cars per day shipped to points beyond Harrisburg.

The Binghamton Limestone Co., Binghamton, N. Y., has plans under way for a new plant at Montrose, Pa., comprising several one-story buildings for crushing, grinding, screening, etc.

The Crystalline Lime Co., Lewiston, Ida., has been taken over by O. M. Collins, who will manufacture agricultural limestone, chicken grit and terrazzo. An up-to-date hydrating plant will be installed later.

The San Bernardino Valley Lime and Rock Co., San Bernardino, Calif., recently organized, is installing extensive quarry equipment on its lime rock deposits and expects to be ready to operate within a short time. Officers are M. P. Bates, president; J. D. Bough, manager, and J. W. Bates, secretary and treasurer.

The Blue Diamond Mortar Co., recently organized at Atlanta, Ga., has under construction a $50,000 plant for the manufacture of wet mortar and plastering. The plant is expected to be ready for operation July 1, turning out a maximum capacity of 200 cu. yd. of mortar plaster daily. Officers are A. P. McCallie, formerly of the Kelley Island Lime and Transport Co., president and general manager; F. G. West, secretary and treasurer; W. H. George and B. R. Padgett, directors.

Concrete Products

The General Concrete Products Corp. has been incorporated at Wilmington, Del., for $75,000.

The Hazelton Brick Co., Hazelton, Pa., reports good business and will operate on full time all season.

The Vader Sewer Pipe Co. has begun erection of its plant at Vader, Wash., which will be modern in every detail. L. A. Spear is president.

The Township Concrete Co., Dayton, Ohio, has been incorporated for $50,000 by C. A. Ney, A. L. Michael, C. O. Dafler, C. Dutton and A. G. Rice.

The Colorado Concrete Roofing Tile Products Co., has been incorporated at Denver, Colo., with a capital of $100,000 by B. A. Gibbons, C. G. Gates and E. M. Wilson.

The Felstone Co., 326 Haywood building, Asheville, N. C., incorporated with a capital of $100,000, has organized with C. Marshall, president and manager; W. L. Gravatt, Jr., secretary; Blair Taylor, treasurer, and will establish a concrete block, ornamental stone and floor tile factory near Biltmore.

The Fond du Lac Concrete Products Corp., Fond du Lac, Wis., which has taken over the interests of the Fond du Lac Cast Stone Block Co., is enlarging its plant and installing machinery and equipment for the manufacture of Shope brick and tile. Officers are D. D. Smith, president; S. Andrew, vice president, and W. A. Becker, director.

Gypsum Products

The Hanover Gypsum Cement Co., Lewistown, Mont., is shipping from three to four cars of cement and plaster daily.

The Pacific Lime and Gypsum Co. will soon be ready to let the contract for a one-story and basement concrete warehouse in Portland, Ore., to be located on the Northeast corner of Second and Main streets.

Manufacturers

The American Concrete Industries Corp. has been incorporated at Wilmington, Del., for $775,000 to manufacture concrete machinery.

The bulletin of the United States Potash Producers' Association denies that the Nebraska Potash Works is planning the immediate rebuilding of its plant. No plans have been made for reconstruction.

C. A. Chapman, Inc., announces the 22d anniversary of Chapman Service as industrial and power engineers, also the opening of its new plant in the Madison Terminal Building, 9 South Clinton Street, Chicago.

Orton & Steinbrenner Co., manufacturers of locomotive cranes, grab buckets and coal crushers, have moved their offices from the eleventh to the nineteenth floor of the Transportation building, 608 South Dearborn Street, Chicago. This change was necessary to secure larger space and they now occupy the entire north end of the nineteenth floor.

Personal

M. J. Johnson has accepted a position as quarry superintendent with the Henry Cowell Lime and Cement Co. of San Francisco, Calif.

Walter J. Evans has been appointed manager of the Philadelphia sales office of the Webster Manufacturing Co., with headquarters at 719 Commercial Trust building.

Frank S. Altman, for the past two years field engineer of the Portland Cement Co., at Topeka, Kans., has been appointed district engineer for the company in charge of Minnesota and North and South Dakota, with headquarters in Minneapolis.

L. S. Trainor has been appointed district engineer in charge of the Illinois district of the Portland Cement Association, to succeed C. M. Powell, resigned. The office, located in Chicago, has charge of association work in Illinois. Mr. Trainor has been connected with the association for the past three years and has been engaged principally in Southern Illinois. Prior to joining the staff he was county superintendent of highways, Marion county, and city engineer of Centralia, Ill.

Trade Literature

Portable Compressor—This pamphlet of the Denver Rock Drill Mfg. Co., Denver, describes the Waugh-Sinclair portable air compressor, its various applications and specifications.

H. H. Clifford of the Hadfield-Penfield Steel Co., Bucyrus, Ohio, wants for immediate delivery a No. 4 and No. 6 crushing plant, capacity 600 tons per day.

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

SUPERINTENDENT
and Master Mechanic

18 years' experience in designing, erecting and operating crushed stone, pulverizing, and concentrating plants, just completing work on large plant, now open for new position. Highest references. If you want a man that knows how and can get the work through, address

Box 1572, care ROCK PRODUCTS
542 So. Dearborn St. Chicago, Ill.

SUPERINTENDENT

With twenty years' experience in construction and operation of large crushing plants, quarry operations using steam shovels and modern equipment; also cement mill and pulverizing experience, will be open for engagement after July 1st. Address

Box 1564, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

POSITION WANTED

by competent sand and gravel plant superintendent. Age 35, married, technically educated, 12 years' experience. Can design and erect efficient plants to effect smooth running organization. Address

Box 1571, care ROCK PRODUCTS
542 S. Dearborn St. Chicago, Ill.

WANTED

Foreman to take charge of the mixing and shipping departments of gypsum plaster mill. One who is experienced in testing. Address

Box 1570, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

WANTED

A competent, experienced manager for sand and gravel business in central Alabama. Correspondence must be strictly confidential. References required. Give full information in first letter. Address

Box 1569, Care Rock Products
542 South Dearborn Street Chicago, Illinois

WANTED

Experienced Pumpman for Electric Driven Hydraulic Suction Dredge located at St. Louis, Mo.

St. Louis Material & Supply Co.
314 N. 4th Street St. Louis, Mo.

WANTED

To buy sand and gravel deposit. Give all particulars. Address

Summit Silica Products Co.
St. Marys, Pa.

QUARRYING BUSINESS FOR SALE

Located Central Pennsylvania. Now in operation. Favorable freight rates. Low royalty on stone.

Winston & Co., Muncy, Pa.

H. E. WIEDEMANN
(Est. 1905)
Consulting and Analytical Chemist
Specialist in Analysis of Rock Products
Chemical Bldg. St. Louis

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

RETURN TUBULAR LOCOMOTIVE **BOILERS** WATER TUBE SCOTCH MARINE

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS—RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE *NOW!*

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION— LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE RANDOLPH 2232

J. F. DAVIS

1122-1123-1124 Harris Trust Building CHICAGO, ILL.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

Rotary Dryers

30 New Direct Fired Rotary Dryers, 4′-0″ Diam. 30 Feet Long

These Dryers were about to be put into operation as the armistice was signed and consequently were never used. We are offering them at a sacrifice, complete with driving mechanism, furnace iron, grates, etc. Some are equipped with steam radiators, for steam heated air drying.

McDERMOTT BROS. CO.
Allentown, Penna.

FOR SALE

1—42-ton Standard gauge Baldwin Mogul, 160-lb. Steam.
1—36-ton Standard gauge Baldwin Mogul, 11′ wheel base.
2—50-ton Standard gauge Brooks 6-wheel switchers, 160-lb. steam..
1—50-ton Standard gauge Shay geared locomotive.
1—42-ton Standard gauge Shay geared locomotive.
2—23-ton brand new 36″ gauge Porter 6-wheel switchers, separate tenders.
2—18-ton O & S 8-wheel two-line locomotive cranes.
1—14-B Bucyrus Steam Shovel, mounted on traction wheels.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR SALE

2—8x110′ Rotary Kilns
6—5x6x7x110′ Rotary Kilns
3—6x16′ Tube Mills, Silax Lined
9—5x21′ Tube Mills, Steel Lining
6—250 H.P. Oil City Water Tube Boilers
1—Coal Dryer
1—Rock Dryer
8—Krupp Ball Mills
1—No. 8 Austin Crusher
4—Engines, 200 to 500 H.P.
8—33″ Fuller Mills
8—42″ Fuller Mills

Shafting, Pulleys, Bearings, and Elevator Equipment, All First-Class Operating Condition

50 Acres of Land and Five Buildings, Stone and Steel Construction. Located at Stockertown, Pa.

ENGINEERING SALES CO., Nashville, Tenn. OLLIE LAWRENCE, Stockertown, Pa.

FOR SALE

No. 2 Allis-Chalmers Gates Gyratory Crusher.
No. 3 Austin Gyratory Crusher.
No. 6 Austin Gyratory Crusher.
Two American Process type 24x48″ Rotary Dryers.
50′ continuous steel bucket (8″x16″) and chain elevator.
50′ continuous bucket (7″x13″) and belt elevator.
25 H.P. simple side crank Heilman steam engine.
125 H.P. 18″x24″ side crank Atlas steam engine.
75 H.P. 13″x16″ side crank Erie City steam engine.
Lidgerwood Standard double cylinder, two drum, 10″x12″ hoisting or cableway engine.
Two 150 H.P. General Electric Co. induction motors, voltage 440 or 220, shop numbers 625140 and 1164925.
Williams No. 9 Swing hammer, Universal type pulverizer.
Worthington 10″ intake by 8″ discharge by 20 cylinders steam pump.
25 tons of 40 to 60 lb. rails.
7—2 yard, all steel, 48″ gauge end dump quarry cars.
One Sanderson cyclone No. 14 electric, non-traction well drill and equipment.

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174 3rd Ave. No., Nashville, Tenn.

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

FOR SALE

Two Schmidt No. 66 Kominuters; and one Krupp No. 8 Ball Mill. All in good second hand condition.

Security Cement & Lime Company
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Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion

FOR SALE

1—De La Vergne 50-hp. Oil Engine in very good condition—Cleveland, Ohio.

1—No. 0 Thew Steam Shovel, 5/8-yard dipper, in good condition—Somerdale, Ohio.

Attractive Prices—Immediate Delivery.

The Superior Sand Company

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FOR SALE

Stone crushing plant complete, in Elk County, Pennsylvania, with well developed glass sand stone quarry. Farm of 300 acres with buildings, fruit trees and timber in connection. Present owner unable to give proper attention. Price reasonable; terms to suit. Address

Box 1566, Care Rock Products

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WANTED

Jaw crusher of well known make, not less than 42 inch by 48 inch opening.

J. B. KING & CO.

17 State Street New York

New—RAILS—Relaying

All sections on hand for quick shipment Reasonable prices quoted. Our stock is very complete.

M. K. FRANK

Frick Building Pittsburgh, Pa

FOR RENT AND SALE

20—12-yd. Western dump cars, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, used 8 months.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, used 6 months.
1—Marion 76 steam shovel, No. 3503, std. gauge, weight 110 tons, used 10 months.
1—No. 2 Brownhoist 4-wheel gas. crane, std. gauge, 40-ft. boom, ½-yd. bucket, new 1921.
64—NEW 18-in. I-beams, 80 lbs. per ft., 40 ft. long, not drilled.
1—NEW Lakewood concrete chuting system.
6—NEW wood-burning locomotive-stacks.

LOCOMOTIVES

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14 and 10-ton Vulcans, 36-in. gauge.

INDUSTRIAL EQUIPMENT CO.

McCormick Building Chicago, Ill.

Crushers and Pulverizers
FOR SALE

1—Lehigh-Fuller Mill, 33" with stock bin.
1—No. 00 Raymond Mill, complete.
2—24" Cogswell Mills.
1—No. 1 Sturtevant Rotary Fine.
3—No. 1½ Sturtevant Rotary Fine.
1—24"x36" Jeffrey Swing Hammer Mill.
1—42"x14" Traylor Rolls.
1—32"x10" Traylor Rolls.
1—24"x8" Chalmers & Williams Rolls.
1—18"x42" Corliss Engine—A-1 condition.

Hulbert A. Bond, Rowayton, Conn.

WANTED

A compressed air operated hollow steel drill sharpening machine. Quote lowest price, condition and where located.

Box 301, Davenport, Iowa

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4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—¾ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

IMMEDIATE DELIVERY

SEND US YOUR STEAM SHOVEL INQUIRIES

66x86 in. TRAYLOR JAW CRUSHER.
No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
25-40-50 HP. D.D. Hoists, 60 Cy., 220-440 V., 3 Ph.
Nos. 3-5-6-7½ & 8K CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2—DISC CRUSHERS, 36" SYMONS.
2—60 ft. BARBER-GREEN 18" BELT CONVEYORS.
100 TON 2½ YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW and ROLL CRUSHERS.
10-15 & 20 Ton Locomotive Cranes.
13x30 in., 9x14 in. and Other Jaw Crushers.
24x54 McLANAHAN ROLL CRUSHER.
Send us your inquiries for Steam Engine, Centrifugal Pumps, Quarry & Cont. Equip., Etc.

ROSS POWER EQUIP. CO., Indianapolis, Ind.

We are in the market to purchase immediately for cash the following equipment:

Jaw Crusher, about 12"x20" opening.
Jolt Screens.
Tap Screens.
Approx. 80' Belt or Chain Elevator, Buckets from 8 to 12" wide.
36" Buhr Mill.
6' Hardinge Mill, lined.
Box Car Loader.

MARYLAND MINERAL CO.
Texas, Md.

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Jeffrey Conveyor 208' long, buckets 15½x10"	950.00
Cummer Dryer, 30 tons sand per hour	2800.00
No. 4½ Champion Jaw Crusher	600.00
Aultman 10x24" Jaw Crusher	800.00

Charles Earl Currie & Co., Ashland, Ala.

"DREDGING PUMP" FOR SALE

One 10" Morris Sand and Gravel dredging pump, 10" suction, 10" discharge, direct connected to double 9x9 engines.
One Scotch Marine Boiler, 200 H. P.

M. A. CALLAHAN
"The Sand Man"
Schofield Bldg. Cleveland, Ohio

For prompt and satisfactory results in buying or selling a plant securing help or a position, use the Classified Department of ROCK PRODUCTS

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BALDWIN

Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

Full information upon request

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PHILADELPHIA

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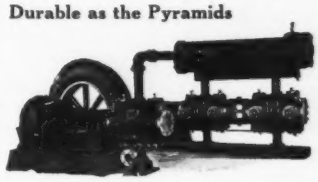
Durable as the Pyramids **Silent as the Sphinx**
All Sizes — All Types



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BYERS MODEL "10" FULL CIRCLE CRANE

Exclusive boom raising device permits changing radius under load, while lifting, rotating or traveling without stopping the Crane.

THE BYERS MACHINE CO.
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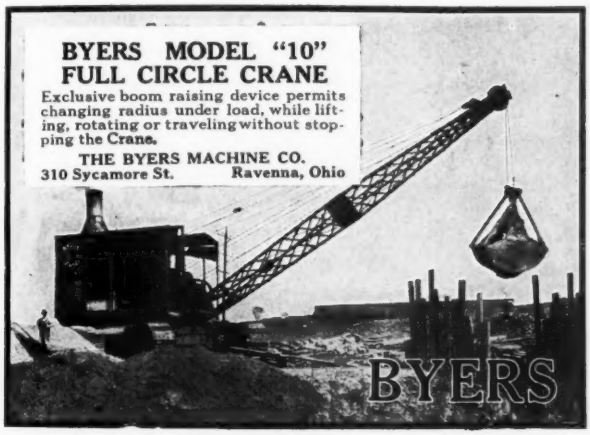
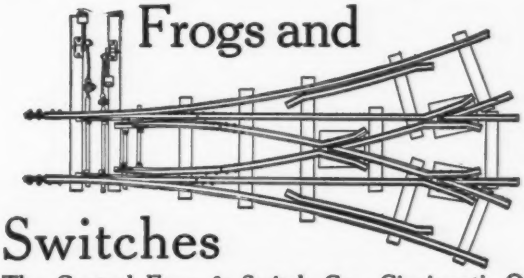


Frogs and Switches



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Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS

dig, convey, elevate and dump in one operation

Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

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Albany Grease

"All Men Know It Knowing Men Use It"

At Your Dealers!

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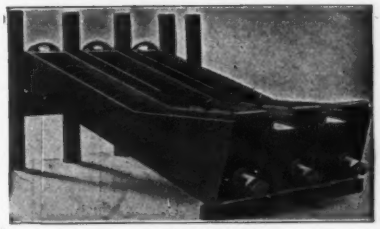
A MARK known and respected around the world — Since 1868 — for fair dealing, a quality product and an unexcelled service



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9-Foot Dry Pan

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LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

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AUTOMATIC WEIGHERS
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY
Adams Bag Co., Cleveland, Ohio.
Bates Valve Bag Co., Chicago, Ill.
Jaite Co., The, Jaite, Ohio.
Valve Bag Co. of America, Toledo, Ohio.

BARRELS—Lime
Draper Mfg. Co., The, Cleveland, Ohio.
International Cooperage Co., Niagara Falls, N. Y.
Sandusky Cooperage & Lbr. Co., Toledo, Ohio.

BARREL MAKING MACHINERY
The D. H. Stoll Co., Buffalo, N. Y.

BELTING
New York Belting & Packing Co., New York, N. Y.

BINS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Neff & Fry, Camden, Ohio (concrete stone)
Weller Mfg. Co., Chicago, Ill. (storage)

BIN GATES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bacon, Earle C., Inc., New York City.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

BOILERS, WASTE, HEAT
Edge Moor Iron Co., Edge Moor, Del.
Freeman Mfg. Co., Racine, Wis.

BRICK MACHINERY
Besser Sales Co., Chicago, Ill.
Shope Brick Co., Portland, Ore.

BUCKETS—Elevator
Brown Hoisting Machinery Co., Cleveland, O.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, O.
Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

BUCKETS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Browning Co., Cleveland, Ohio.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.
Williams Co., G. H., Erie, Pa.

CABLEWAYS
Blaw-Knox Co., Pittsburgh, Pa.
S. Flory Mfg. Co., Bangor, Pa.
Interstate Equip. Co., New York, N. Y.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

CARS—Quarry and Industrial
Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
Gehret Bros., Bridgeport, Pa.
Kilbourne & Jacobs Mfg. Co., Columbus, O.
Watt Mining Car Wheel Co., Barnesville, Ohio

CAR DUMPERS
Car Dumper & Equip. Co., Chicago, Ill.

CAR PULLERS
Weller Mfg. Co., Chicago, Ill.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., N. Y. City.

CEMENT MILL REPAIRS
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CHAINS
Morse Chain Co., Ithaca, N. Y.

CLUTCHES
Webster Mfg. Co., Chicago, Ill.

COMPRESSORS, AIR
Ingersoll-Rand Co., N. Y. City.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co., Chicago, Ill.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.

CRANES—Locomotive Gantry
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., The, Cleveland, Ohio.
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York, N. Y.
Bradley Pulverizer Co., Allentown, Pa.
Buchanan Co., Inc., C. G., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
Dixie Crusher Co., St. Louis, Mo.
Fuller-Lehigh Co., Fullerton, Pa.
Gruendler Pat. Crusher Co., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Kaltenthaler, H. J., Philadelphia, Pa.
K. B. Pulverizer Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Munson Mill Machinery Co., Utica, N. Y.
New Holland Machine Co., New Holland, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CLUTCHES
Weller Mfg. Co., Chicago, Ill.

DERRICKS
Terry Mfg. Co., New York, N. Y.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

DREDGING MACHINERY
S. Flory Mfg. Co., Bangor, Pa.
Keystone Driller Co., Beaver Falls, Pa.

DRILLS
The Loomis Machine Co., Tiffin, Ohio.
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

DRILLERS
Pennsylvania Drilling Co., Pittsburgh, Pa.

DRYERS
American Process Co., New York City.
The Reeves Bros. Co., Alliance, O.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DYNAMITE
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

ENGINES—Steam
Morris Mach. Works, Baldwinsville, N. Y.

ENGINES—Oil
Kahlenberg Bros. Co., Two Rivers, Wis.

ENGINEERS
Arnold & Weigel, Woodville, Ohio.
Artingstall, S. G., Jr., Chicago, Ill.
Austin Co., The, Cleveland, Ohio.
Bacon, Earle C., Inc., New York, N. Y.
Buckbee Co., J. C., Chicago, Ill.
Crow, Waller, Inc., Chicago, Ill.
Ehrsam & Sons Co., J. B., Enterprise, Kans.
Federal Bridge & Structural Steel Co., Waukesha, Wis.
Fuller Engineering Co., Allentown, Pa.
James N. Hatch, Chicago, Ill.
R. W. Hunt & Co., Chicago, Ill.
Randolph-Perkins Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Waller Crow, Inc., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Keystone Driller Co., Beaver Falls, Pa.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
Morgan Construction Co., Worcester, Mass.

GEARS
Caldwell, H. W., & Son Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Plamondon Mfg. Co., Chicago, Ill.

GENERATORS
Burke Electric Co., Erie, Pa.

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of the Rock Products Industry

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Lewistown Fdy. & Mach. Co., Lewistown, Pa.

GRATES
The Kramer Bros. Fdy. Co., Dayton, Ohio.

GRINDING MILLS
Munson Mill Machinery Co., Utica, N. Y.

HOISTS
Flory Mfg. Co., S., Bangor, Pa.
J. S. Mundy Hoisting Engine Co., Newark, N. J.
Ottumwa Iron Works, Ottumwa, Iowa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Ingersoll-Rand Co., New York City.
N. Y. Belting & Packing Co., New York, N. Y.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

LIME HANDLING EQUIPMENT
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
Arnold & Wiegel, Woodville, Ohio.
Blaw-Knox Co., Pittsburgh, Pa.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Haiss Mfg. Co., The Geo., New York City.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa.
Brookville Truck & Tractor Co., Brookville, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Industrial Equip. Co., Minster, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York, N. Y.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MOTORS, ELECTRIC
Burke Electric Co., Erie, Pa.

MOTOR TRUCKS
Packard Motor Car Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PACKING—Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber & Mfg. Co., Cincinnati, Ohio.
N. Y. Belting & Packing Co., New York, N. Y.

PAINT AND COATINGS
Williams, C. K., & Co., Easton, Pa.

PERFORATED METALS
Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PLASTER MACHINERY
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

PORTABLE CONVEYORS
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.

POWDER
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

POWER TRANSMITTING MACHINERY
Caldwell, H. W., & Son Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
K. C. Hay Press & Tractor Co., Kansas City, Mo.
Morris Machine Works, Baldwinsville, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PULLEYS
Weller Mfg. Co., Chicago, Ill.

PULVERIZED FUEL EQUIPMENT
Fuller-Lehigh Co., Fullerton, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

PUMP VALVES
N. Y. Belting & Packing Co., New York, N. Y.

QUARRY EQUIPMENT
Universal Road Mach. Co., Kingston, N. Y.

ROPE, WIRE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

SCALES
Richardson Scale Co., Passaic, N. J.

SCRAPERS, DRAG
Green, L. P., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

SCREENS
Chicago Perf. Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Tyler Co., The, W. S., Cleveland, Ohio.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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Sturtevant Mill Co., Boston, Mass.
Tyler Co., The W. S., Cleveland, Ohio.

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Weller Mfg. Co., Chicago, Ill.

SHOVELS—Steam and Electric
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Bucyrus Co., South Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., The, Marion, Ohio.

SHOVEL REPAIRS—Steam and Electric
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

SLATE WORKING MACHINERY
S. Flory Mfg. Co., Bangor, Pa.

SPROCKETS
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SPROCKET CHAIN
Webster Mfg. Co., Chicago, Ill.

STEEL PLATE CONSTRUCTION
Blaw-Knox Co., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

STORAGE BINS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Neff & Fry, Camden, Ohio

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Metro-Nite Co., Milwaukee, Wis.
Middlebury Marble Co., Brandon, Vt.
Vermont Milling Products Co., Fair Haven, Vt.

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Central Frog & Switch Co., Cincinnati, Ohio.
Easton Car & Constr. Co., Easton, Pa.

TANKS, STEEL STORAGE
The Blaw-Knox Co., Pittsburgh, Pa.
Traylor Eng. & Mfg. Co., Allentown, Pa.

TESTING SIEVES AND TESTING SIEVE SHAKERS
Tyler Co., The W. S., Cleveland, Ohio.

TRAMWAYS
Interstate Equip. Co., New York, N. Y.

TRANSFORMERS
Burke Electric Co., Erie, Pa.

TRANSMISSION MACHINERY
Plamondon Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago Ill.

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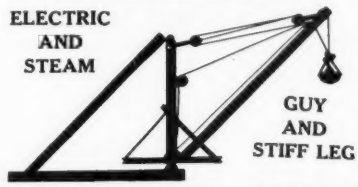

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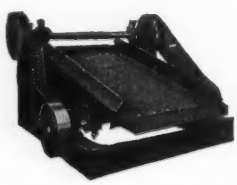

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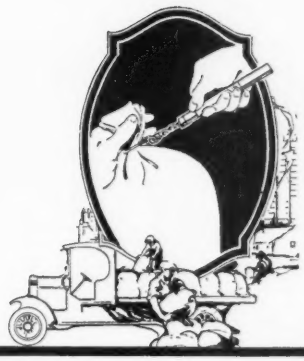

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have long since been universally accepted as the most secure, saving, and efficient means for closing bags of all sizes and descriptions.

OVER THREE HUNDRED MILLION BAGS were closed the Bates Way during 1921 in the Rock Products Industries alone.

A Free trial of Bates Wire Ties will convince you and will show you how we save time and money for our big family of satisfied customers.

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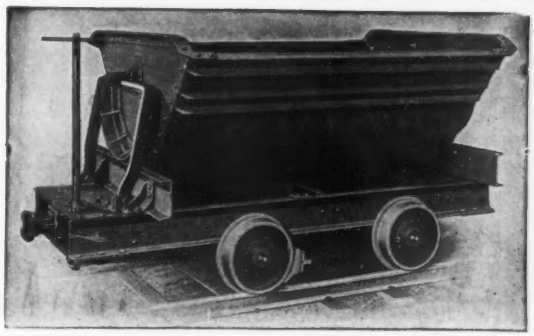

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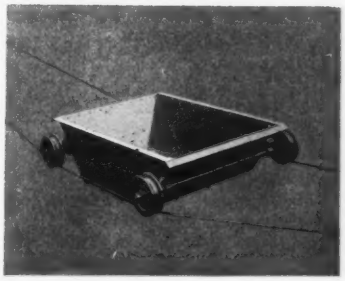

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The Costs of
Installation
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Justify its use at mine or quarry

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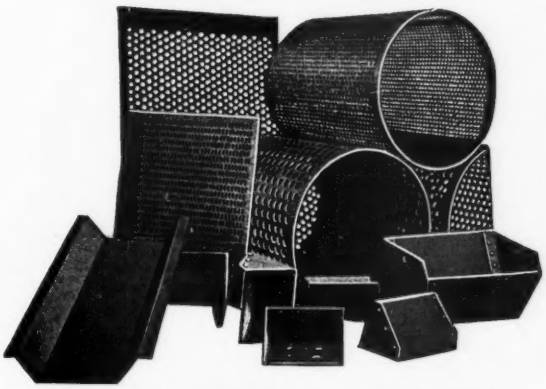

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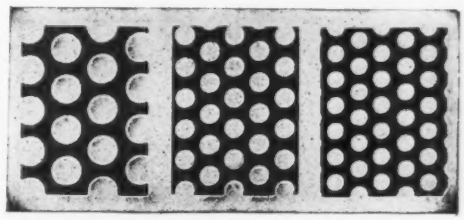

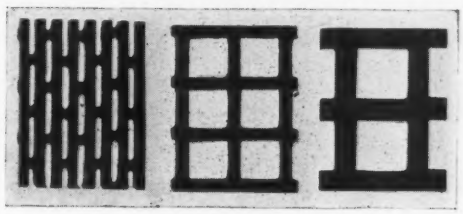

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All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

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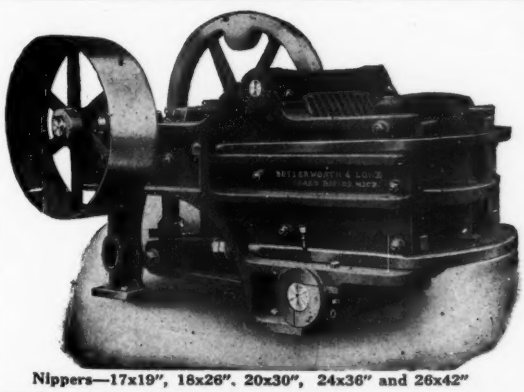

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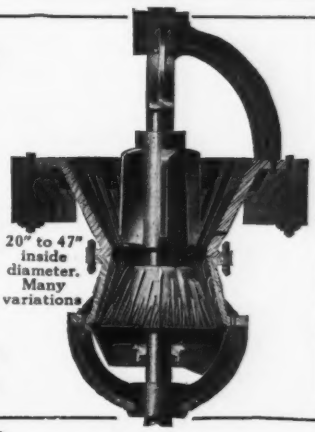
For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime



20" to 47" inside diameter. Many variations

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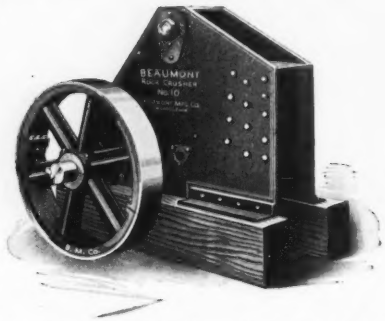

Built for great strength where hard crushing, portability and efficiency are required

Size	Jaw Opening	Tons Per Hour	H.P. Required	Weight
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10	10″x20″	16-24	18	12,300
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Immediate Shipment can be made on above size Crushers.

Beaumont Screens
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Send for prices and full information on our equipment.

Manufactured by

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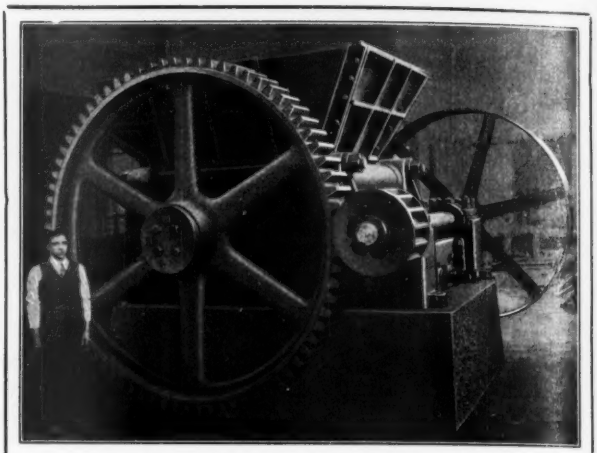

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After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

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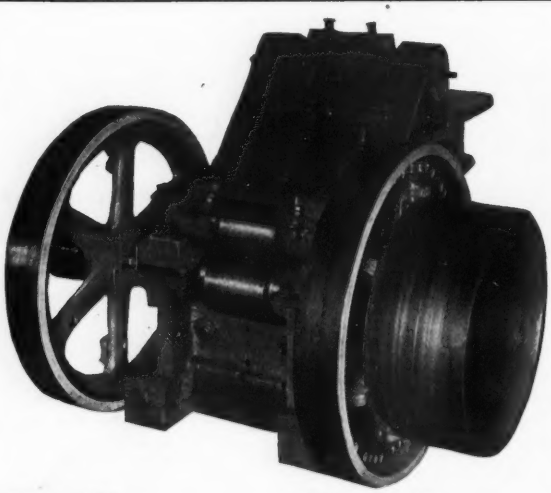
Screens, Elevators, Conveyors, Rock Washers, Etc.



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IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

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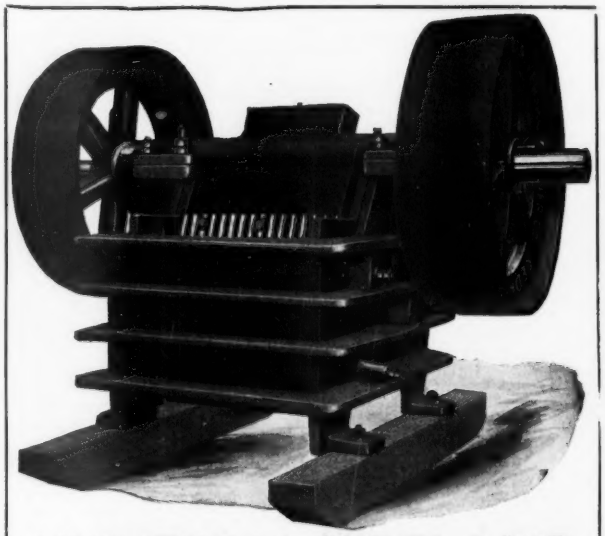
Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT



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THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8″x36″. Capacities 20 to 200 tons daily. Crushes to ¾″ and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

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STEAM SHOVELS

REDUCED YARDAGE COST

is the problem OSGOOD Revolving Type Shovels are solving every day and doing it easy due to their Rigid and Compact Construction and ease of handling.

Horizontal Hoisting Engines, Vertical Submerged Tube Type Boilers, All-steel Caterpillar mountings, Quick Acting Power Steering Devices and Double Drive Shipper Shaft are only a few Features of construction but are IMPORTANT TO YOU.

Write us your requirements and let us show you why you will do better with an OSGOOD.

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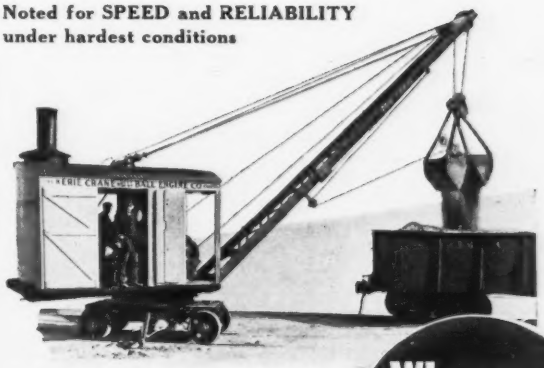
Noted for SPEED and RELIABILITY under hardest conditions



This machine saves you money even when it is working at only one-fourth capacity, and replacing only 10 or 12 men—

And when you have ***rush orders,*** and are working your plant to the limit, your ERIE Crane can give results like these:

When you need extra output

"We loaded 300 tons of sand in 2 hrs. and 10 mins., digging 3 to 8 ft. below track level. This time included moving from car to car.

"This is too speedy, but we wanted to know what our ERIE Crane can do."—W. B. Manny, President, Hoosier Slide Sand Co., Michigan City, Ind.

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Builders of ERIE Steam Shovels and Locomotive Cranes

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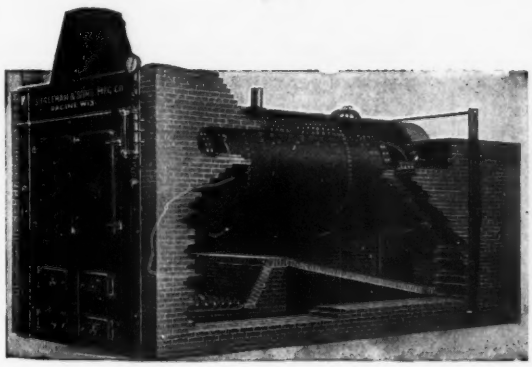

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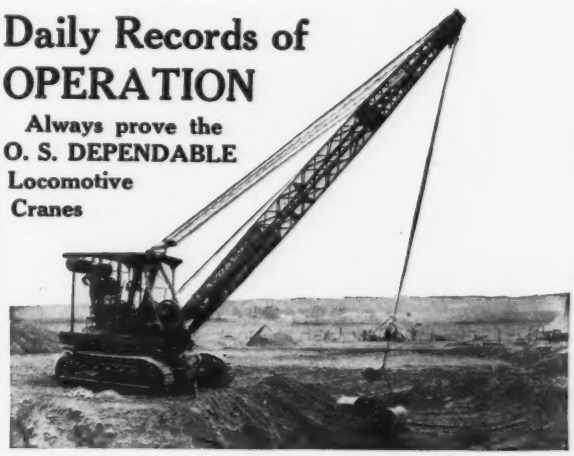

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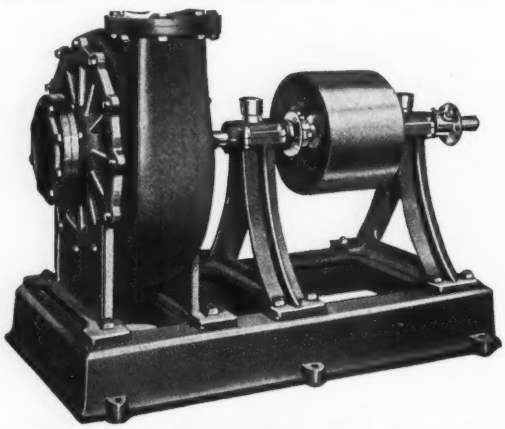

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They are easy to operate, easy to adjust, and easy to replace parts. Shell and Runner made of Semi-steel.

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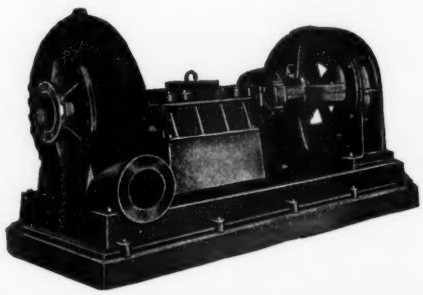

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Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4" up, arranged for belt, motor, or engine drive.

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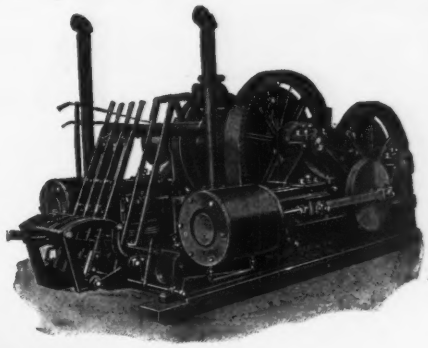

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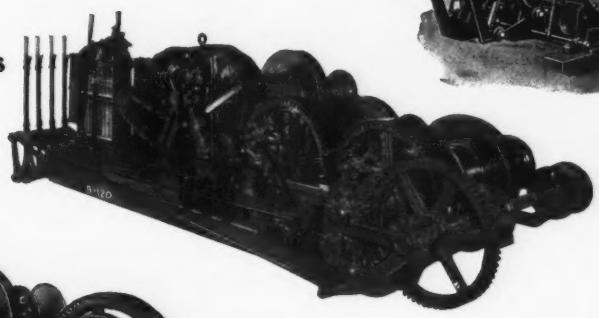

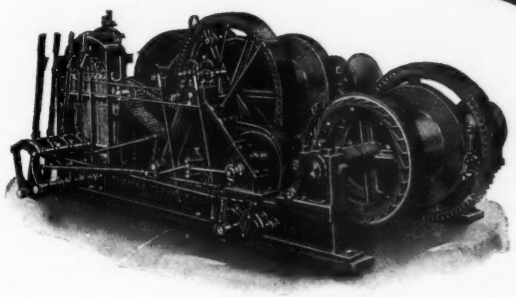

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ELEVEN SIZES.
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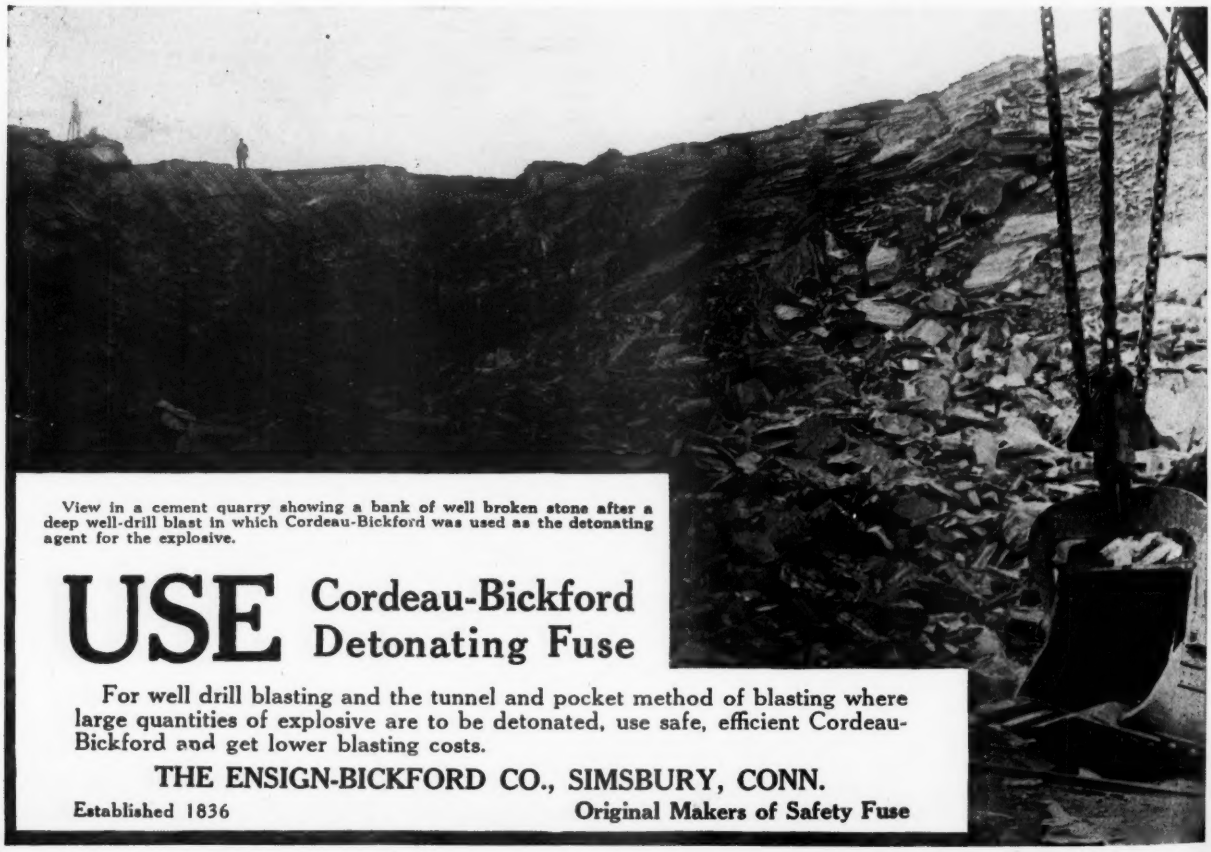
Works and Main Office: 5301 South Western Boulevard, Chicago, Illinois

EMERGENCY ORDERS RECEIVE SPECIAL ATTENTION



View in a cement quarry showing a bank of well broken stone after a deep well-drill blast in which Cordeau-Bickford was used as the detonating agent for the explosive.

USE Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.

Established 1836 **Original Makers of Safety Fuse**

Here is the Solution to Your

Fine Grinding Problem

Many of the leading concerns have found the solution to their fine grinding problems on Gypsum, Cement, Talc and Soapstone, Graphite, Limestone and similar materials by installing

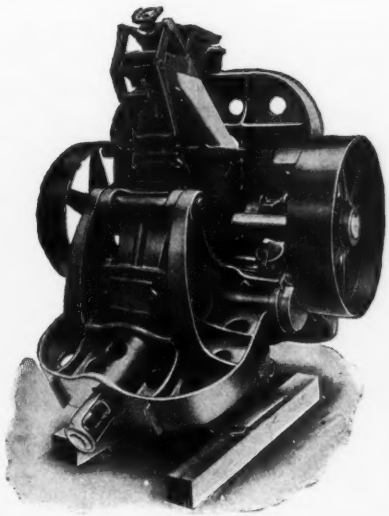
MUNSON

Under Runner Buhr Mills

There is practically no limit to the degree of fineness to which these mills will grind these products. They will do the work economically and satisfactorily in every way. Solid in construction—will do away with delays and shut-down and keep out of the repair shop. Their Automatic Adjustment, Rapid Grinding and Perfect Balance Insure good results and fine and uniform grinding.

Why not investigate? Send for our new catalog, number 71

MUNSON
Mill Machy. Co., Inc.
Utica, New York



MAXECON

Preliminary Grinder for Tube Mills

LIMESTONE ..... 20 to 40 Mesh
CEMENT CLINKER ..... 20 to 60 Mesh

MAXECON MILL
PERFECTECON SEPARATOR

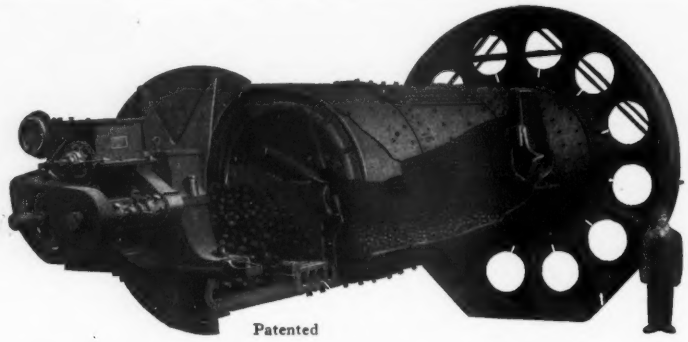
The UNIT that has LARGER OUTPUT with LESS POWER WEAR and ATTENTION than any other.

It will be to the interest of those who operate CEMENT PLANTS to know what the Maxecon Unit will do.

Drop us a line **We will be glad to tell you about it**

Kent Mill Company

10 Rapelyea Street **BROOKLYN, N. Y.**



Patented

Where There Is Undivided Responsibility

Whether you are planning a new plant, an extension or a replacement, the value of undivided responsibility in connection with your new equipment is an important consideration.

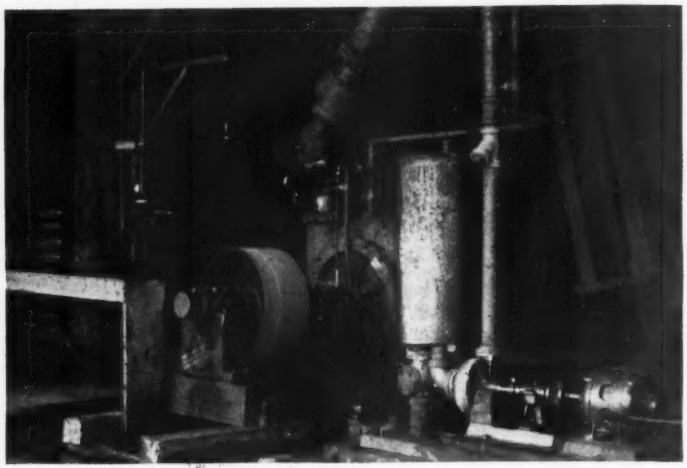
Allis-Chalmers equipment used in many of the leading plants of the country includes heavy machinery for many varied engineering and power purposes, prime movers of all types among which are some of the largest units ever built, complete crushing and cement plants for large dams and irrigation projects, electrical apparatus and many complete lines of industrial machinery.

By reason of this experience the Allis-Chalmers Organization is able to propose and furnish equipment best suited to meet the particular requirements of its customers with complete equipment built by one organization, under a single supervision, the many details, complications and delays incident to divided responsibility are avoided.

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

AMSCO

MANGANESE STEEL PUMPS



"Users opinion" is our strong selling talk, and we are glad to have any prospective purchaser visit a plant where an "Amsco" is installed and let the sale rest on the opinion he gets from the owner. Here is an installation at the Hahn-Muscatine Sand and Gravel Plant at Muscatine, Iowa. In this case an 8" pump is used for pumping sand from draining pit to storage bin and is giving unusual satisfaction.

AMERICAN MANGANESE STEEL COMPANY
General Sales Offices, Chicago Heights, Ill.
Plants: Chicago, Heights, Ill. New Castle, Delaware Oakland, California

When writing advertisers please mention ROCK PRODUCTS

McGINTY GRATES at the Ohio Hydrate & Supply Company

"The only Grate to use, it does not warp, cuts ashes clean and is a grate that can stand up."

That's what E. G. Baker, President of the Ohio Hydrate and Supply Company says of the McGinty Grate.

There is some satisfaction in having a conservative member of the Lime Industry come out flat-footed with a statement bubbling over with enthusiasm; but after all Mr. Baker speaks from long experience, knows what he is talking about.

The twelve Kilns that were included in the original installation of the Ohio Hydrate and Supply Co's plant were equipped with McGinty Grates.

The new installation of twelve Kilns are also equipped with McGinty Grates.

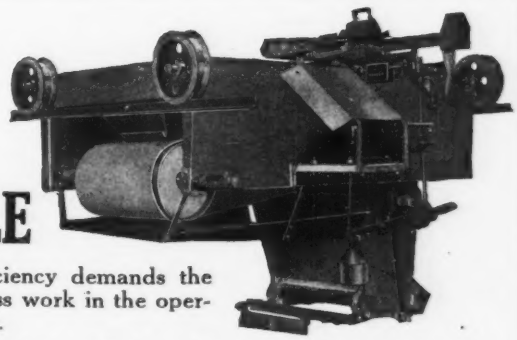
This makes twenty-four Kilns equipped with McGinty Grates, or 96 sections in all.

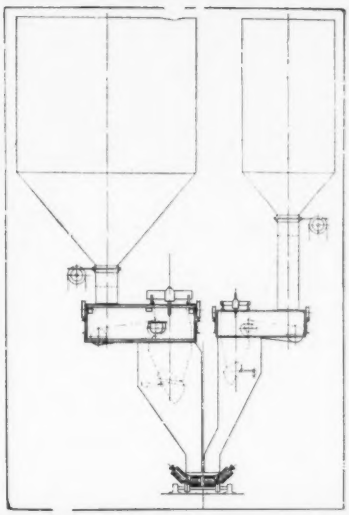
Repeat orders tell the story of user satisfaction with more effect than a ton of superlatives, and we believe any embellishment on Mr. Baker's statement would be an overdose.

We would like to give you complete information about these Grates, and a partial list of satisfied users

THE KRAMER BROS. FOUNDRY CO.
Dayton, Ohio

Register Your Fuel Consumption and Lime Output with a RICHARDSON AUTOMATIC BULK SCALE





Modern business efficiency demands the elimination of all guess work in the operation of a Lime Plant.

Accurate and dependable knowledge of each step in production is essential for complete success.

Richardson Automatic Scales record accurately and automatically. They are a continuous check on fuel extravagance from any cause, and you will know, hour by hour, exactly how much coal is used in each boiler, or in each kiln.

These scales will also register your exact output of lime, giving you an indisputable record of your production as against your fuel charges.

The Richardson Automatic way is the sure way—it eliminates all guess work

RICHARDSON SCALE COMPANY
Passaic, New Jersey

Branch Offices: New York, Boston, Atlanta, Memphis, Buffalo, Chicago, Wichita, Minneapolis, Omaha, San Francisco

The Evans Lime & Stone Co. saved $10,000 last year with an American Gas-O-Motive

The AMERICAN GAS-O-MOTIVE

A Friend of Work

User satisfaction in the American Gas-O-Motive as an investment, is due to its unvarying service over a long period of time.

The continued wonderful performance of this locomotive, its splendid reliability, ruggedness and power is the fruit of years of skillful co-ordination of design and manufacturing.

Made in sizes from 4 to 7 tons
Gauges from 24 to 56½ inches

The Hadfield-Penfield Steel Co.
Bucyrus, Ohio

Ford Ton Truck Efficiency, Economy and Service

Applied to Industrial Railway Haulage through the use of Brookville Attachments, combined with the Ford Ton Truck power unit.

It is unnecessary to invest several thousand dollars in order to get away from slow and expensive horse or mule power. Most quarry operations work only during favorable weather conditions. Motor costs only while in actual operation, while horses and mules are a bill of expense the year round. This converted Ford Gasoline Locomotive will not only save you money over mule haulage, but in many instances will cut down operating expenses one-half over heavy, and slower machines double its weight.

Ford ton truck unit is left practically intact, giving the purchaser all the advantages of local Ford Service.

Our special auxiliary reverse Brookville transmission gives the Ford ton truck high and low operating speeds either direction. No necessity of turntables or "Y's" permitting of as many as four round trips hourly over track one-half mile in length.

Heavy auxiliary frames of sectional oak, 8" ship channel, and cast iron gives ample weight and traction.

Pivoted Hyatt roller bearing pony front permits motor working around any curve that the average industrial car will take.

Will handle from two up to twenty tons to trip on high gear, depending on track and grade conditions.

Four years on the market has proven machine has no competitor as to efficiency, economy, and service.

Submit us your haulage conditions and details. If excessive for the machine we will advise you frankly to that effect. If in its class will accept order from any reliable firm, subject to 10 days' approval. We can't offer more.

BROOKVILLE TRUCK & TRACTOR COMPANY, BROOKVILLE, PA., U. S. A.

A. J. Alsdorf Corp., 404 South Wells Street, Chicago
Foreign Distributors

A. R. Woolridge Co., 220 King Street, West, Toronto
Canadian Distributors

A Shay Locomotive Built in 1883

THE Shay Geared Locomotive pictured above was built in 1883 for the Falls Branch Coal Company, Wooldridge, Tennessee. It is in good condition and working steadily today, after thirty-nine years of hard usage. Note the length of the train it is hauling. Lima built good locomotives then; we build better ones now.

The purchase of a quarry locomotive represents an investment. To insure a proper return on such an investment the locomotive must be such as to operate efficiently over a period of years.

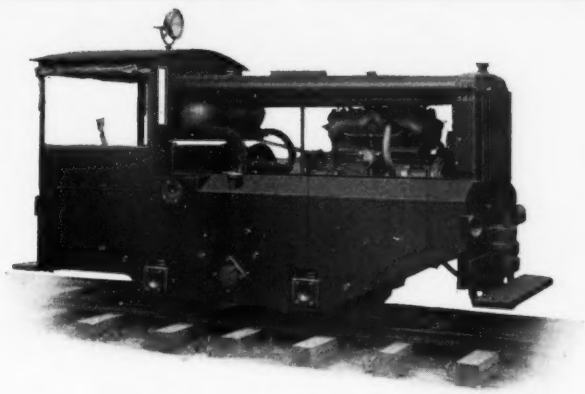
Every Shay Geared Locomotive is a good investment.

Write or wire us. We'll gladly help you select a locomotive that will give you years of reliable, low-cost hauling.

LIMA LOCOMOTIVE WORKS, Incorporated

Lima, Ohio 17 East 42nd Street, New York

Minster Industrial Locomotives



Model "F" in 6-, 7- and 8-Ton Sizes

For Service and Lasting Economy

No other locomotive on the market surpasses the "MINSTER" in giving satisfactory service over periods measured by years.

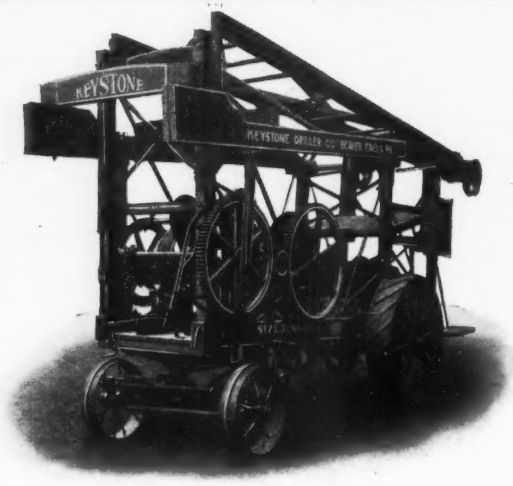
**Where there is real work to be done—
You will find a "MINSTER"**

The Industrial Equipment Company

310-316 Ohio Street, Minster, Ohio

Eastern and Export Department

THE HERBERT CRAPSTER CO., INC., ONE MADISON AVENUE, NEW YORK CITY



TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

BLAST HOLE DRILLS

have much behind them—40 years' development, a clean record for long and efficient service, a strong and well reputed manufacturer. They have many friends and few detractors. They are built as well as we, or any other maker, can produce well-drilling machines and are sold as close to factory cost as a fair minded purchaser would ask.

In Limestone and Cement Quarries the SIZE 3½ TRACTION with ELECTRIC MOTOR to suit individual current conditions, is commonly specified. It can be equipped with steam boiler and engine if preferred. It has a double beam, which counter-balances the drilling tools and insures a rapid and effective drilling stroke. Keystone welded bits are offered for use in very hard rocks.

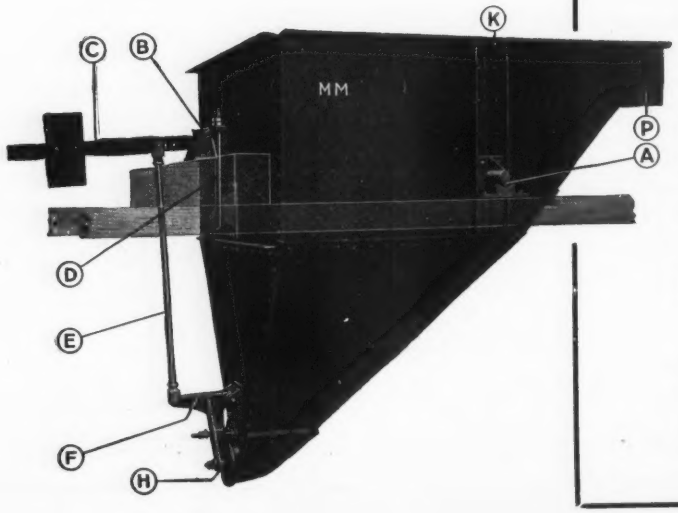
Our book on BLAST HOLE DRILLING with CABLE DRILLS contains important information valuable to any Quarry Superintendent, Engineer or Driller. Sent with our General Drill Catalog of Machines for Water and Oil Wells, Mineral Prospecting, etc., on request.

Keystone Driller Company, Beaver Falls, Pa.

Makers of Keystone Well Drills, Keystone Excavators and Downie Pumps

784 170 Broadway, New York Monadnock Block, Chicago Joplin, Mo.

Telsmith Sand Tank

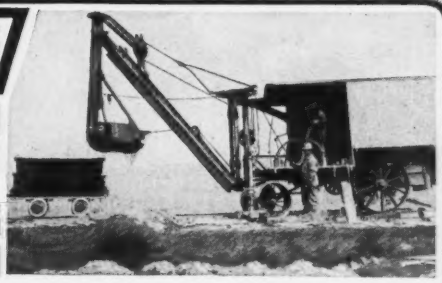


The Telsmith Sand Tank and its counterweight-arm are both carried on knife-edge bearings, with a wide range of adjustment. As the tank pivots one way, the valve plate pivots in the OPPOSITE DIRECTION, giving ample discharge area with a short, snappy valve action. The swing of both members is limited by an adjustable stop, so that the sand is discharged in SMALL QUANTITIES but at FREQUENT INTERVALS, assuring a deep sand-bed and a dry product.

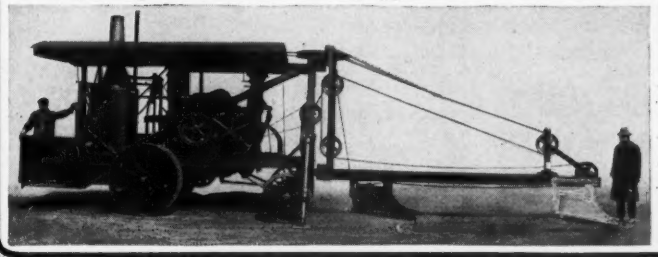
This tank works automatically and reliably, with only ordinary inspection service. Here's a chance to cut your pay-roll by one man. Send for bulletin No. S-T-11.

SMITH ENGINEERING WORKS 3188 LOCUST ST.
MILWAUKEE, WISCONSIN

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE
STEAM SHOVELS FOR STRIPPING OVER-BURDEN



Where the rock surface is too rough to permit the movement of machines or wagons the KEYSTONE stands on the natural ground level and reaches down into the crevices and depressions with its PULL STROKE DITCHER BUCKET, loading into cars or trucks as shown above. It has a POSITIVELY CONTROLLED DEPTH REACH OF EIGHTEEN FEET and a capacity of about 300 to 400 cubic yards per day. It can be equipped also with clamshell.



For use on level surfaces, loading earth or stone, the SKIMMER BUCKET, shown at left, is mounted without changing boom.

Two Sizes—Model No. 3-10 ton and the Model No. 4-14 ton.

Quickly and easily movable on its own traction power, it is a general utility machine.

The good Keystone Digging Ideas in our Catalogs and advertising sheets will interest quarry engineers and superintendents.

Keystone Driller Company, Beaver Falls, Pa.

Makers of Keystone Well Drills, Keystone Excavators and Downie Pumps

705 170 Broadway, New York Monadnock Block, Chicago Joplin, Mo.

"A WILLING WORKER"

It is sometimes difficult to get the first olive out of the bottle, but after you get the first one the rest comes easy.

It's the same in selling Type "J" Locomotive Cranes. Sell one Type "J" and repeat orders follow.

WHY?

Because it is a regular "honest to goodness" crane, big by comparison, both in size and service.

It is human nature to like a willing worker, one that does a full day's work, day after day, without interruption or without coaxing.

Try out the type "J" and its operation will speak more convincingly than anything that can be said of its merits.

The McMyler Interstate Company
Cleveland, Ohio LC-108

BRANCH OFFICES:

New York City.....1756 Hudson Terminal Building
Chicago, Illinois.....812 Edison Building
Seattle, Washington.....Hoge Building
Denver, Colorado.....18th and Wazee Streets
San Francisco, California.....766 Folsom Street
New Orleans, Louisiana.....444 Maison Blanche Annex
Birmingham, Alabama.....Brown-Marx Building
Boston, Massachusetts.....261 Franklin Street

Making Barrels

at the

Rockland-Rockport Plant

Every piece of machinery, every bit of equipment passed the test of the ultimate in efficiency and economy in operation before it was installed at the Rockland-Rockport Lime plant.

The E. & B. Holmes Cooperage Machinery, having demonstrated its value in numberless installations, is now turning out barrels for this plant; barrels that will keep and deliver lime in the finest possible condition over a long period of time.

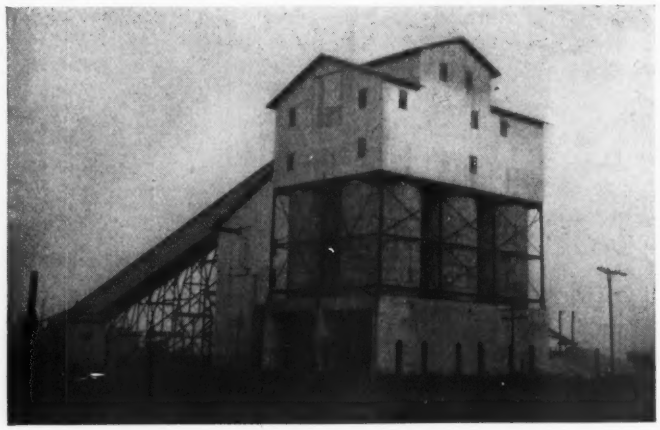
The Holmes equipment at the Rockland-Rockport plant includes three No. 72 Heaters, one No. 3 Fan for Heaters, one No. 120 Hoop Expander, one No. 38½ Crozer, one No. 48 Trusser, and one No. 59½ Setting Up and Windlassing Machine.

Let us tell you how you can save money, time and trouble in your cooperage department

E. & B. HOLMES MACHINERY CO.
BUFFALO, N. Y.

LET NEFF & FRY DO IT

Let us build your storage bins. We build them for every need and every purpose, build them of concrete staves, puddled or power tamped, 2½ or 3½ in. thick, concrete blocks 8 in. or monolithic with 6-in. wall.



Six Neff & Fry Bins at Keystone Gravel Co., Dayton, Ohio

We will assume all of the responsibility, will do all the erecting and give an ironclad guarantee.

We will modernize your methods, beautify your yard, increase your business and save you money.

Write for catalog, or better still, let us know your needs, and we will advise you, without obligation the size and type of bins best suited to your requirements.

Three factories located at Kalamazoo, Mich., Peoria, Ill., Camden, Ohio, insure low freight rates

NEFF & FRY, Camden, Ohio

Eastern Office—736 Drexel Building, Philadelphia, Pa.
General Office—Camden, Ohio

THE

SANDUSKY

COOPERAGE & LUMBER CO.

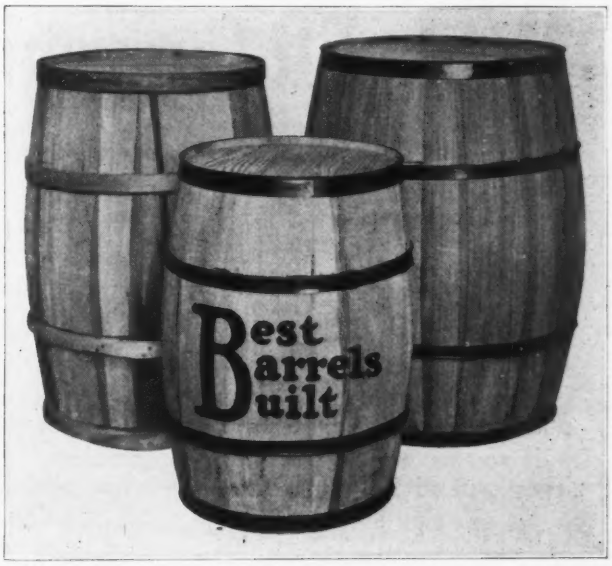
TOLEDO, OHIO

LIME BARRELS

Are Perfectly Made Barrels

One of our 52 operations is close enough to give you instant service on kiln dried steel hoop barrels. Shipments can be made in "made-up" or "Sandiscoped form."

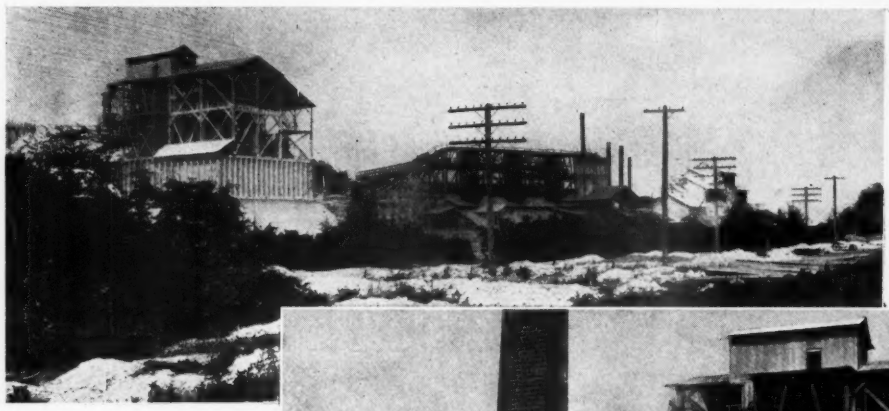
A telescoped barrel ready to draw in top and drive hoops. We furnish device for doing this work

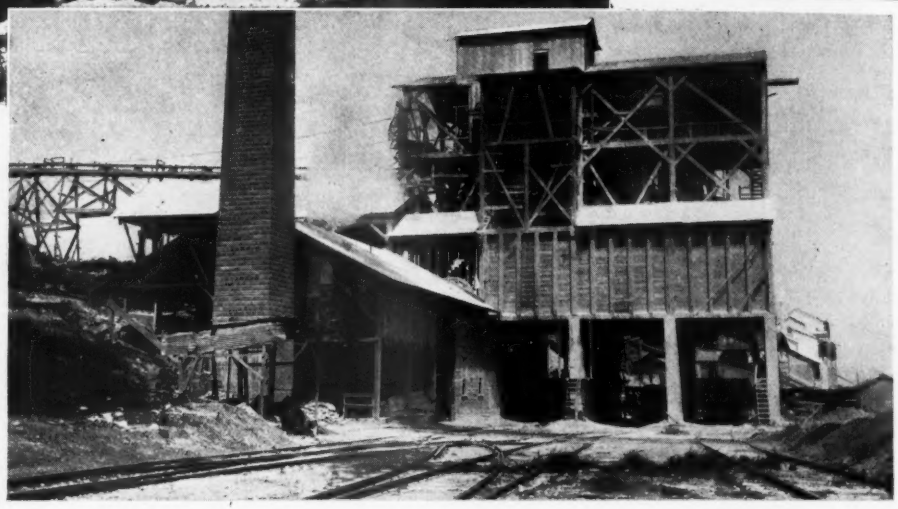


Finished barrel

SANDUSKY COOPERAGE & LUMBER CO.

General Office, TOLEDO, OHIO





WELLER MADE CHICAGO

WELLER Conveying Equipment

AT THE DITTLINGER LIME CO.

The Dittlinger Lime Co. plant located at New Braunfels, Texas, the largest and oldest plant in the state, is equipped with Weller Elevating, Conveying and Screening Equipment.

The Dittlinger Co. have been a user of Weller Machinery for years, and knowing the satisfaction they had always received, when it came to placing the order for machinery for the lime plant, of course the order was placed with the Weller Manufacturing Co.

Weller Machinery is doing duty in a large number of lime, cement and gypsum plants, and is giving the service at the lowest cost for upkeep.

If you have a material handling problem, consult with our Engineering Department. They will advise you without prejudice, and the consultation entails no obligation.

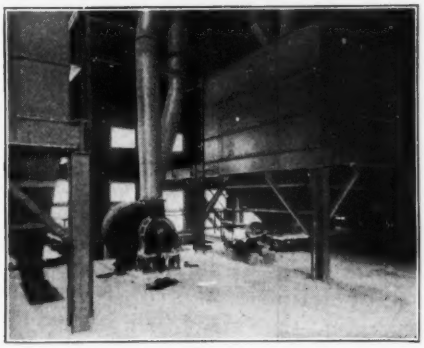
Tell us what you want to handle. Catalogs will be sent

Weller Manufacturing Company

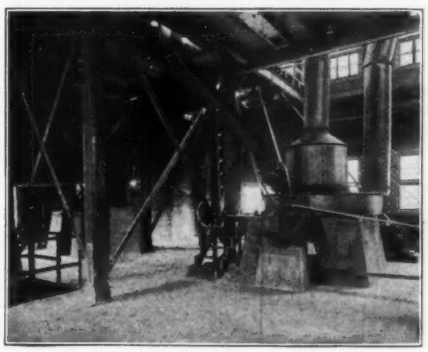
Main Office and Works: 1820-1856 North Kostner Ave., Chicago, Ill.

SALES OFFICES

New York Boston Baltimore Pittsburgh Cleveland Detroit Salt Lake City San Francisco



Raymond Special Exhaust Fan Direct Connected to Motor



Raymond Roller Mill with Gypsum Dryer in Background at Left

Raymond Roller Mills For Hydrated Lime

For those producers of Hydrated Lime who have a high grade material from which they do not wish to remove the impurities such as core, sand, and over burned lime, Raymond Roller Mills will give just the kind of finished product wanted.

They will reduce all of the Hydrate, including the impurities, to a fine uniform powder which is Air-Separated to remove oversize material, and deliver finished product direct to storage bins above the bagger.

The grinding is done at an exceedingly low cost for power and repairs.

We invite correspondence from those who feel that all the lime can be ground up without removal of impurities and especially those who are now grinding on some other type of mill, as we feel that the figures we now have on operating costs will show that Raymond Roller Mills will pay for themselves in one to two years' time.

Raymond Bros. Impact Pulverizer Co.

1301 North Branch Street Chicago, Ill.

Western Office: 1002 Washington Bldg., Los Angeles, Calif.
Eastern Office: 50 Church St., New York City

SHOPE BULLETIN

VOL. I June 17, 1922 Number 21

The Shope Process

The Shope process is the result of much thought and many experiments and has long passed out of the experimental stage as is evidenced by the fact that in Portland, Ore., a Shope brick plant has been operating for 12 years. Anyone stepping into a Shope plant would marvel at the apparent simplicity of the process of manufacture and the methods of handling raw materials and finished brick. This apparent simplicity is due to the care given in developing the process and the machines necessary to the operation of the process. So far has the development of this industry gone that any intelligent laborer can in a short time become an expert brick maker.

The products of the Shope process are common brick of first class quality and face brick of surpassing quality. Heating, thawing and freezing will not cause the facing on the face brick to chip, spall, crack, cleave or fade. The facing is an integral part of the brick and cannot be removed without taking part of the backing with the face. The process of facing is patented.

Tests have been made to prove our claim that the facing is non-fading.

Get information concerning rights to manufacture this products. It is paying others and will pay you

Shope Brick Company

361 East Morrison Street **Portland, Oregon**

LICENSEES:

The Miles Co. Salem, Ore.
Eugene Concrete Co. Eugene, Ore.
Wastenburg Brick Co. Klamath Falls, Ore.
Arizona Shope Concrete Brick Co. Phoenix, Ariz.
Florida Nu-Tex Brick Co. 108 Water St., Tampa, Fla.
Texas Shope Brick Co. 3056 Sumpter Bldg., Dallas, Tex.
Birmingham Slag Co. Birmingham, Ala.
Shope Brick Co. of Wisconsin 50th and State Sts., Milwaukee, Wis.
The Polychrome Cement Brick & Tile Co. Carter-Cotton Bldg., Vancouver, B. C.
Dark Canyon Stone Co., H. W. Jones, Mgr., Rapid City, S. D.
Warren Sand & Gravel Co. Easton, Pa.
Penn Shope Brick Co. Reading, Pa.
Lycoming Shope Brick Co. Williamsport, Pa.
Shope Brick Co. Portland, Ore.
Rustic Brick & Supply Co., Palette Rd., Ford City, Ont., Can.
Puyallup Shope Brick Co. Puyallup, Wash.
The Shope Brick Co. Springfield, Mass.
Utah Shope Brick Co., P. O. Box 632, Salt Lake City, Utah
Decoration Brick Co. 1565 N. Lake Ave., Seattle, Wash.

These licensees are all successful manufacturers

Send for this book

It points the way to

More profitable screening and crushing!

Screens wet and dry materials from 2½" opening to 200 mesh.

Used on more than 75 kinds of material.

A FUND of valuable information on screening and crushing is contained in this 80-paged book on Hum-mer *Electric* Screens.

This remarkable screen makes screening and crushing more profitable—makes wire cloth screen faster and wear longer—and *makes screening a pleasure* in hundreds of plants throughout the United States.

$50,000 has been saved per year by one company through the installation of six Hum-mers. Another company saved $13,000 per year with one Hum-mer.

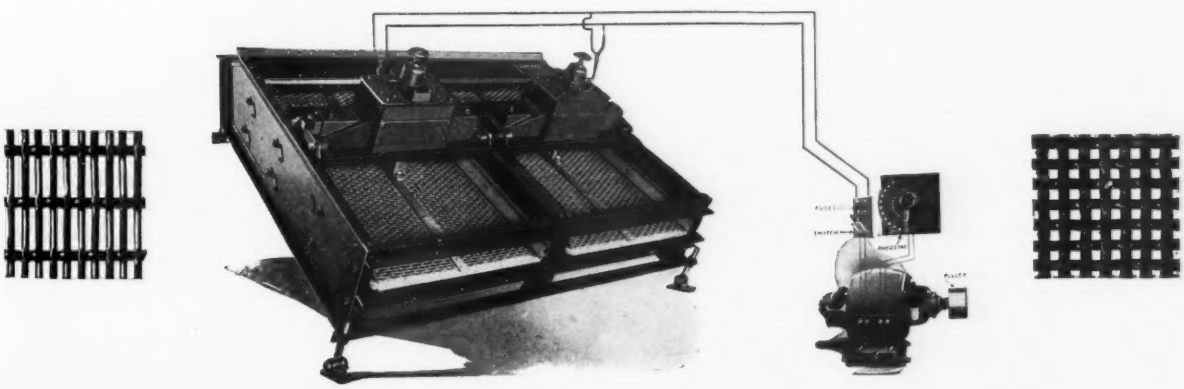
The Hum-mer process of screening is being employed profitably on over 75 different kinds of materials.

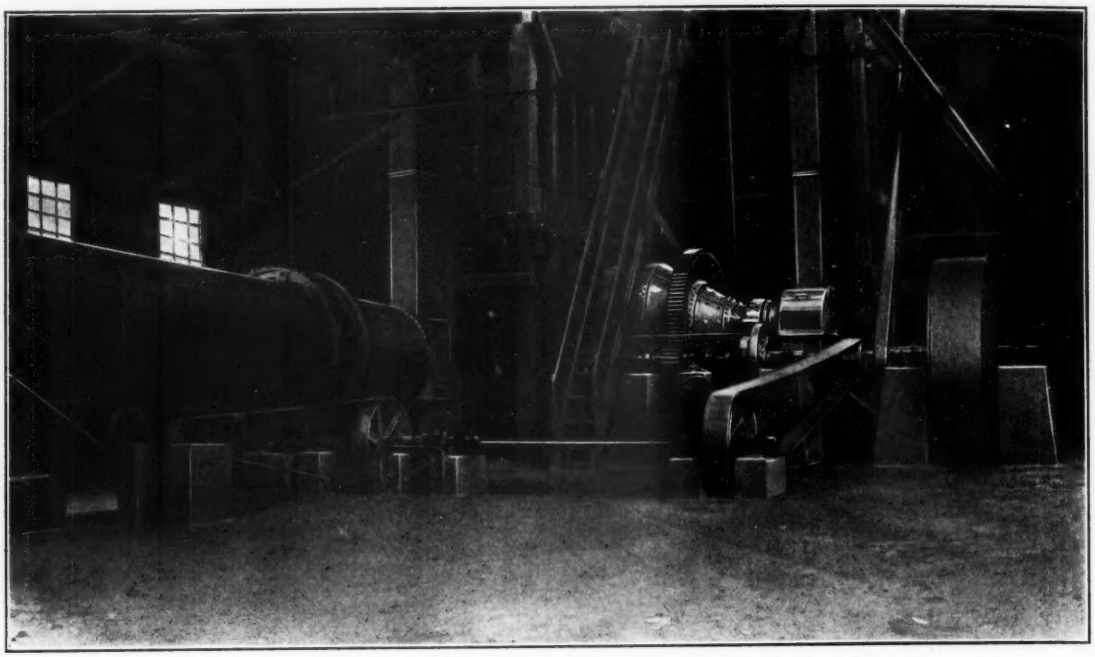
Investigate the Hum-mer now. *Don't let your competitor get the edge on you.*

Write for Catalog **45-R**

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

Manufacturers of Woven Wire Screens and Screening Equipment





The Most Up-to-Date

LIMESTONE GRINDING PLANT

Includes a Hardinge Mill And Ruggles-Coles Dryer

This plant supplies limestone for road construction work, concrete, and ground agricultural limestone.

Here is the general arrangement:

Mine and quarry to cars, to No. 7½ Gates crusher, to elevator, to 30-ft. long revolving screen.

Oversize return No. 5½ Gates crusher returned to revolving screen.

Sizes 2½" to ¾" for road work and concrete construction work or recrushed for additional feed to pulverizing department.

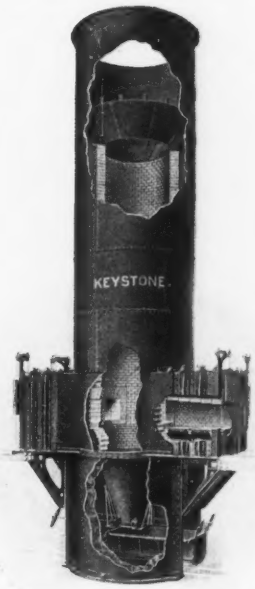
¾" and under to **A-8 Ruggles-Coles Dryer** to 7' x 36" **Hardinge Conical Ball Mill** and Hum-Mer electric screen to bin to Bates valve sacker or direct to car. (12-15 tons per hour)

It is the use of the Ruggles-Coles dryer and Hardinge Conical Ball Mill combination which results in an almost fool-proof pulverizing department.

Write for information on the system covering your requirements

Ruggles-Coles Engineering Co.
120 Broadway, New York, N. Y.

Hardinge Company, Incorporated
120 Broadway, New York, N. Y.



Some Facts About

LIME BURNING

Do you know that:

A good, burnt lime is only obtained where the temperature can be regulated at will and maintained constant after regulation?

Or that the product should always be in view in the firing zone to insure satisfactory burning?

Or that unless means are provided to readily break down an "arch" a poor product and inefficient operation will result?

Or that a cooling cone or drawing shears enables the operator to draw his lime directly into barrels or box cars for immediate shipment?

If you are an experienced operator, all these points will appeal to you.

If on the other hand you are contemplating the installation of lime burning equipment for the first time, you should certainly write for facts about the Keystone Lime Kiln, for it is this kiln which embodies all these features.

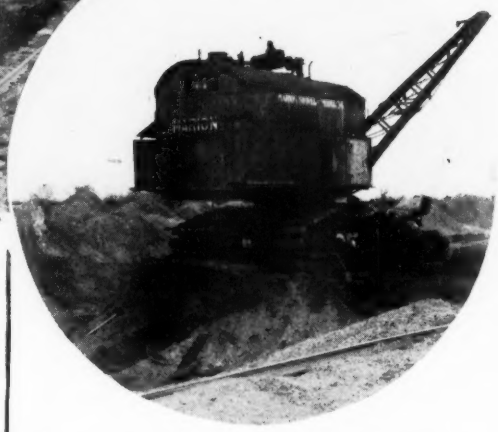
Write for Catalog

STEACY-SCHMIDT MANUFACTURING COMPANY

YORK, PENNA.

Keystone Lime Kilns

What They Say About the MARION



J. Fred Smith Gravel Company
(INCORPORATED)

PITS AT
GRIBBLE ON FRISCO
LETOT ON M. K. & T.

Capital Stock Paid up $200,000

1202 SOUTHWESTERN LIFE BUILDING

Operating Two Drag Lines
Loading Capacity 100 Cars Daily

Long Distance Telephone LD-85

DALLAS, TEXAS

August 15, 1921.

Marion Steam Shovel Co.,
Advertising Department,
Marion, Ohio.

Gentlemen:-

We have your letter of the 13th acknowledging receipt of three photographs of our gravel pit showing Model 61 Marion Shovel and Model 36 Marion Dragline we are operating.

These machines absolutely do the work and the little 36 Dragline is as handy as a pocket in your shirt. We get around places with it when the larger machine will not go. We strip off the overburden, and then crawl down and dip the gravel out of the water with this little machine, loading around 50 cars per day. We'll say we like this machine.

The steam shovel can load more gravel per day, but the problem of keeping the water out of the pits is expensive, and unless we are doing an extra big business the Dragline is cheaper to operate. However, when we have the business and can get the cars we like the steam shovel, as we have loaded 85 cars in one day with this machine.

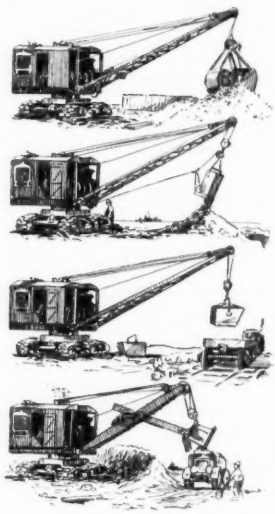
It is an easy matter to load 30 to 40 cars per day with the little Dragline, and an easy matter to load 50 to 60 cars per day with the Steam shovel.

We are well satisfied with the experience we have had with the Marion products, and should we be in the market for any machinery you manufacture in the future would naturally give you people the first chance at the business.

Yours truly,
C. A. Jackson

J. FRED SMITH GRAVEL CO.

Marion Revolving Shovels can now be furnished with steam, gasoline or electric power



As a Clamshell or Orangepeel Crane for loading or unloading cars, loading from stock pile, etc., speedy, wide working range and easy to operate.

As a Dragline for stripping overburden, digging drainage canals and miscellaneous work. Equipment is readily interchangeable with any other attachments.

As a Material Handling Crane for making repairs of heavy machinery, handling rails, ties, cars, etc. A practical locomotive crane adapted to all kinds of work.

As a Standard or High Lift Shovel for loading into cars, trucks or wagons. Length of boom can be varied to suit working conditions. Rugged, powerful and speedy.

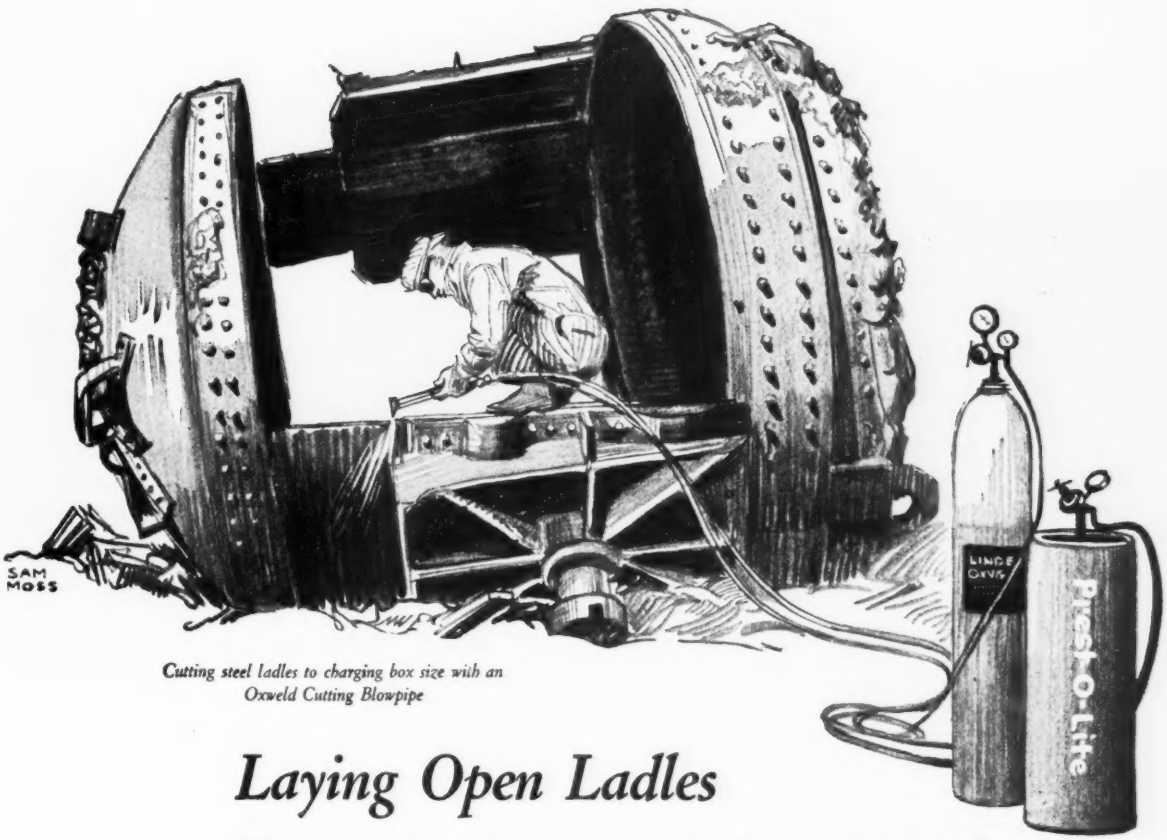
THE **Marion** STEAM SHOVEL CO.

Established 1884 **Marion, Ohio**

New York Chicago Atlanta San Francisco

Portland—Clyde Equipment Co.	**Denver**—H. W. Moore & Co.
Salt Lake City—H. W. Moore & Co.	**Detroit, Mich.**—
Portland—Clyde Equipment Co.	W. H. Anderson T. & S. Co.
Seattle—Clyde Equipment Co.	**New Orleans, La.**—
Spokane—Clyde Equipment Co.	C. H. Stem, 518 Conti St.
Boise, Ida.—Clyde Equipment Co.	**Philadelphia**—
Billings, Mont.—Connelly Mchy. Co.	H. L. Cox, 13th & Cherry St.
Dallas—F. B. Wright, Busch Bldg.	**Pittsburgh**—J. W. Patterson
Vancouver—	**Vancouver Machinery Depot, Ltd.**
Montreal, Toronto—	**F. H. Hopkins & Co., Ltd.**

EVERYWHERE RELIABLE
THE Marion STEAM SHOVEL CO.
ESTABLISHED 1884



Cutting steel ladles to charging box size with an Oxweld Cutting Blowpipe

Laying Open Ladles

When so massive a piece of metal as this ladle is to be scrapped the only means of handling the job quickly, neatly, and economically is by the use of the Oxweld Cutting Blowpipe.

What Oxweld has done for others—Oxweld can do for you.

The intensely hot flame, under perfect control at all times, eats through steel and iron as rapidly and accurately as a saw cuts wood.

And just as the Oxweld Cutting Blowpipe is indispensable where metal is to be severed, so the Oxwelding Torch is a necessity where metals are to be swiftly and permanently joined.

The twin processes are in daily use in hundreds of factories—helping to make better products in less time and at greatly reduced costs—and the oxwelding and cutting blowpipes are also saving thousands of dollars and weeks in time by reclaiming worn and broken machinery on the spot and in a few hours.

Oxwelding can save you money—why not ask to have an Oxweld Service Engineer show you how? They are stationed in more than fifty important cities and there is no charge for such service.

Write for an illustrated book "Oxweld Can Do It!"

An illustrated book "Oxweld Can Do It" tells what oxwelding is doing—write for it

OXWELD ACETYLENE COMPANY · *Newark, N.J.* · *Chicago* · *San Francisco*

Sales Representatives in the Principal Cities of the World

WORLD'S LARGEST MAKER OF EQUIPMENT FOR OXWELDING AND CUTTING METALS

1308-22

Buyers' Bulletin

MANUFACTURERS OF MACHINERY AND EQUIPMENT:—These inquiries are live, up-to-date inquiries that have come direct to us from the individual in each case.

READERS OF "ROCK PRODUCTS":—This Department is for your special help and service. If you do not see what you require advertised in "Rock Products," tell us your needs and we will publish them here. There is no charge for this service.

Julius E. Espey, R. F. D. "D," San Antonio, Texas, writes us as follows: "We would like catalogs and prices on the following items: Glass sand washing, drying and screening machinery for a 100 to 250 ton per 10 hour plant."

Concho Washed Sand Co., 108 E. 103d St., Oklahoma City, Okla., are in the market for machinery for pumping and washing sand, erecting bins and electric motor, 50 H.P., 220 volt, 60 cycle, 3 phase. They are in the market for immediate delivery of this equipment.

Second Hand Equipment Wanted

Kirkpatrick Sand & Cement Co., American Bank Bldg., Birmingham, Ala., advise that they expect to be in the market for a used Class 14 Steam Bucyrus Dragline Excavator.

Tritschler & Sons, Inc., 220 W. 42d St., N. Y. City, would like to get in communication with quarries crushing a red stone for stucco; also quarries desiring an efficient sales outlet for their products—roofing granules or terrazzo or stucco stone.

Free Service to Readers of Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT
ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

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Name.....

Address.....

City..... State.....

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IDEAS—

You could use an idea now and then, couldn't you?
You'll find plenty of new ones, short cuts and time savers in ROCK PRODUCTS.

Our traveling editors are running around, dropping in here and there finding out just how things are done, and then they tell you how the other fellow makes things hum.

Practical stuff—tested ideas—something *you* can use
Better fill out the blank and mail it to us today

ROCK PRODUCTS Date.....1922
542 So. Dearborn St., Chicago, Ill.

Please enter my subscription to ROCK PRODUCTS for.....year.... (one year $2.00, two years $3.00—please state which. You save a dollar by subscribing for two years), for which we enclose $..... Canadian and Foreign Subscriptions $3.00 a year.

Name.....

Street.....

City.....State.....

We produce:.....

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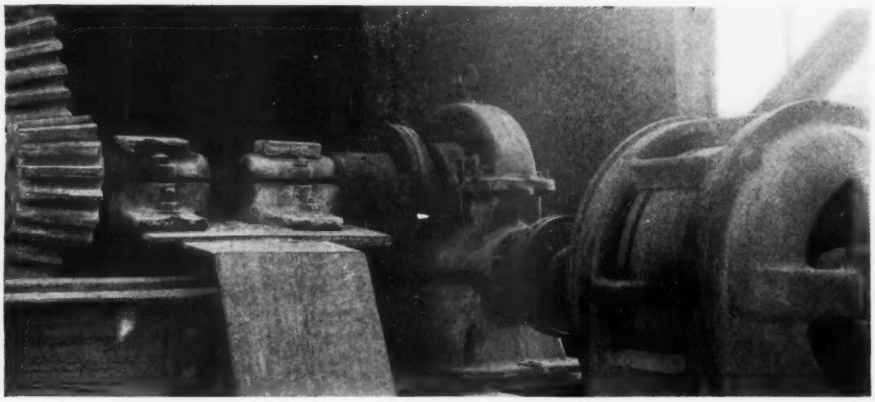
We retail.....

Cleveland
WORM GEAR REDUCTION UNITS



Cleveland Worm Gear Reduction Unit applied to rotary screen in screening plant. Motor 25 h.p., 860 r.p.m. Ratio in worm drive 7½-1.

Used in the American Lime and Stone Co.'s plant

It is not surprising to those who know "Cleveland" Worm Gearing to learn that the fine, modern plant of the American Lime & Stone Company, at Bellefonte, Pa., is equipped throughout with Cleveland Worm Gear Speed Reduction Units.

That their choice is the result of satisfactory experience is perfectly obvious. Builders of a plant like this do not experiment. They seek the finest and most efficient equipment.

Last year 75% of ***our entire business*** was done with companies who had previously used our product.

Our growth has been possible only because of the continuous seeking for better things on the part of American engineers and our sincere effort to supply the most efficient drives.

We are always glad to hear from those who have a speed reduction problem.

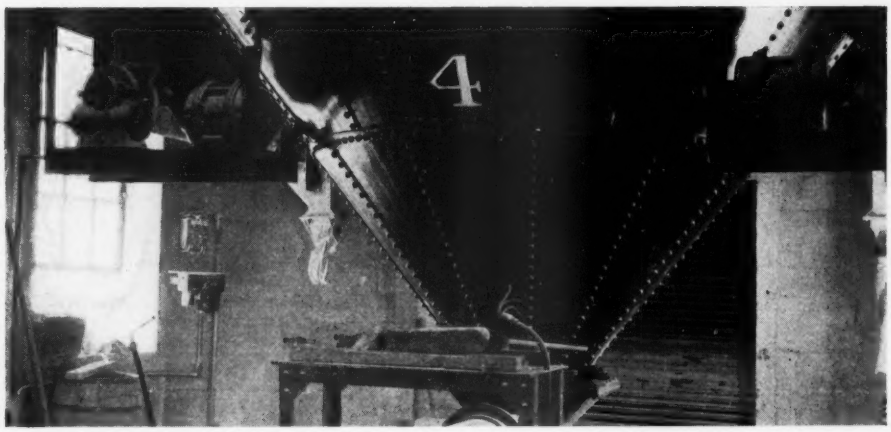
Write us.

THE CLEVELAND WORM & GEAR CO., CLEVELAND, OHIO

America's Worm Gear Specialists

DRAVO-DOYLE COMPANY, Pittsburgh
Cleveland, Indianapolis, Philadelphia
New England Representatives
FRANKLIN MACHINE CO., Providence, R. I.

Pacific Coast Representatives
ALFRED H. COATES CO., San Francisco, Cal.
Rocky Mountain States Representatives
THE VULCAN IRON WORKS CO., Denver, Colo.



Cleveland Worm Gear Reduction Unit taking reduction between motor and screw conveyor which draws lime from storage tank. Motor 3 h.p., 565 r.p.m. Ratio in worm drive 9⅗-1.